What's in this issue—

What are the manufacturing problems which are solved in government arsenals? If you will turn to page 456 you will find a complete description of the **ingenious machining work that is done at the Watertown arsenal.** Good pictures add to the interest.

The Nathan Manufacturing Company **bores brass injectors on horizontal boring machines** instead of on turret lathes. You will see how it is done on page 464.

The Old Man, now retired, always commanded the respect of the shop men. **The new manager seems much smarter, but somehow the men don't "go for him."** Dad, in another of his homely discussions, reveals why on page 465.

Do you know about the new metal-working machinery that is in the development stage? **Take a look at the new patents** listed on page 492.

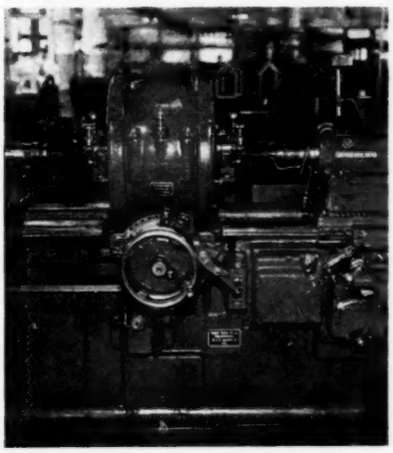
Machining a 46-foot circle on an 18-foot boring mill is no ordinary job. Westinghouse had to do it for the mounting of the Mt. Palomar 200-inch telescope. On page 460 are the details, with excellent pictures, of how the problem was licked.

If you want to find out what the **causes of gear noises are and how to correct them,** read the data on page 477 and examine the sketches. The information is so valuable that we have included it as part of American Machinist's Reference Book Sheets.

What happens to shop efficiency when operators feel that any job may be their last? That is the basis for the Round Table discussion on page 471.

It isn't so hard to keep track of the cost **of heat-treating work** if you know how to do it. Gaylord G. Thompson, industrial engineer of Fairbanks, Morse & Company, gives you a good formula on page 472.

Dodge Division of Chrysler recently opened its **new transmission manufacturing plant at Kokomo, Ind.** It is newly equipped throughout. How it is laid out and what operations are performed are told on page 467. There are good pictures too.



Dodge uses a double-end grinder to finish the cluster-gear bore

Just what are the **facts about RFC loans to industry** and what terms must be fulfilled to get them? None other than **Jesse H. Jones,** RFC's chairman, outlines them on page 455 in an article written exclusively for *American Machinist.*

Production of an **enduring plate on zinc-alloy die-castings** is a highly developed art. B. F. Robinson of Continental Die Casting Corporation describes on page 468 how it can be done economically and dependably. The article is worth a close reading.

Handling large lathe chucks is no small task. On page 478 you will learn about a small jib crane with which one man can safely do the work.

Lack of good lighting accounts for many a bad job. Symptoms of a dingy shop are described in an animated spread on pages 462 and 463.

There is much **new equipment** being put on the market these days. Our editors scour the country for new products which they can describe for you. The latest batch of descriptions is on page 479.

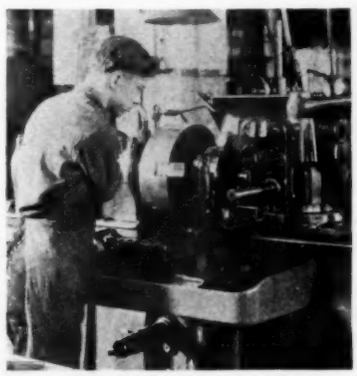
COMING

Toughness is the chief attribute of a tractor and has to be built into the product if it is to stand up. How International Harvester makes tractors that can take it by modern machining and heat-treating facilities will be told in the next number.

Standard time data are all important to shop executives. In the next number, *American Machinist* will commence an extensive series of time data sheets covering a wide range of operations used in metal-working plants. The first set will deal with material handling operations as developed by Westinghouse for use at the Pittsburgh works.

Job shop layout is not nearly so obvious as a plan put in to meet steady production. However equipment arrangement is highly important for jobbing work, and an article on the subject will reveal a good layout.

The apprentice school at E. W. Bliss is self-governing through an "Honor Council." The system has proved its worth in fostering responsibility as a part of shop training, as will be shown in a forthcoming article.



Boys at the Bliss school learn self-discipline as well as shop methods

Omega

TOUGH

and then som

OMEGA takes the heavy batter jobs in its stride. It's right in its o element when between an air hamm and some hard, defiant material. Ome was specially developed for shock sisting parts where a combination of h ductility and hardness is required. I unbeatable material for both hand a pneumatic chipping chisels, rivet s heading tools, punches and all simi tools that must stand up under dras repeated impacts at normal tempe tures.

Omega is only one of the compl range of Bethlehem Tool Steels. Perha your special requirement is for a steel with minimum shrinkage, o high-speed steel that will stand up heavy hogging cuts in tough materi Bethlehem makes these and other ste each as much a leader in its field Omega. Reference to the Bethlehem T Steel Guide will aid you in the selec of the grade to handle your tasks.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

AMERICAN MACHINIST

ESTABLISHED 1877

F. H. COLVIN • K. H. CONDIT • BURNHAM FINNEY, Editors

Let Industry Alone

INDUSTRY has been badly buffeted. It has been kicked in the pants by the New Deal, h d its ears pulled and been spat at by government-backed unionists, had its ills diagnosed by hostile quack doctors and has otherwise been knocked around by an unsympathetic public.

Despite this rough treatment, it is expected to come through with the wherewithal to restore the country to prosperity. Even New Deal partisans admit that "the national income will get back to where we enjoy a decent way of living in the United States *only if there is investment of large amounts of private funds in our economic machine.*"

If that be the case, the only way to reach that objective is to restore industry's confidence in the government. The minute that is done, private funds will begin to flow freely into the nation's economic system. Yet is anything being done, beyond the expression of pious wishes, to restore confidence?

Left Wing advisors of the administration are proposing to put American industry under a planned economy system similar to that set up by Secretary Wallace for the farmer, reports *The New York Times.* The plan would be to control production and other phases of economic activity, while the United States Treasury would supply pump priming in periods of cyclical decline. Advocates of this proposal say that President Roosevelt has already taken steps preliminary to its fulfillment. Is such news calculated to restore industry's confidence?

The TVA is to purchase large chunks of utilities' properties and public authorities in Nebraska are moving in the same direction. Well and good, provided that the government agrees to refrain from competing with utilities outside of clearly designated localities. Yet the pending federal pump-priming bill, which has the President's blessing, provides for resumption of federal loans and grants to municipalities for construction of power plants. Is that calculated to restore industry's confidence?

THUMB THROUGH the newspaper and take a look at what government is doing. The President wants the reorganization bill revived. The President insists that the wage-hour bill is a "must" piece of legislation. Secretary Wallace challenges the Chief Justice regarding the rightness of an important Supreme Court decision. The National Labor Relations Board continues its one-sided operations. The government, pushing a spending program which national polls show that the people do not favor, proposes to pile billions more onto a national debt which today is at the unprecedented height of $37,459,000,000.

This is no way to restore industry's confidence; but to say so does not imply that industry's program is negative. To be sure, industry, instead of calling "Help!" cries "Don't help!" That is because it feels confident that, if it is left alone, the positive program which its leaders have already presented can be swung into action.

Gaging Business

OPERATIONS in the metal-working industries have sagged a bit and promise to drop off to lower levels for the summer months. Reports from all sections of the country indicate that most companies will play a waiting game for the next ninety days and will ascertain what the political and economic trends are before embarking on programs requiring sizable capital outlay. Bolstered mostly by foreign orders, machine tool companies nevertheless have seen their backlogs dwindle further as domestic volume receded.

Shipments abroad of power-driven metal-working machinery in April aggregated $7,861,515 compared with $5,119,671 in the same month of last year. Steel production, currently at 26.1%, is retreating in the face of decreased tonnage from major consumers. Automobile factories and parts plants are preparing for prolonged shutdowns. The government's spending program will be so slow getting started that it probably won't help much during the summer months. Railroad purchases of equipment don't appear bright. Conditions in the South and Southwest are much better than in other parts of the country. Business Week's index of business activity is at 59.1 as against 58.2 on May 14.

NEW ENGLAND—Machinery dealers are expecting government orders when funds are allocated for naval construction. One shipyard is preparing preliminary estimates for $100,000 of equipment. Textile labor troubles have quieted. A Maine utility is spending $250,000 for hydro plant extension.

CHICAGO—After staying on a low level for six weeks, electric consumption is climbing. Steel people feel a little better though orders are thin. Road machinery makers, despite good prospects, find it hard to close contracts. Glass blowing machinery companies say that shipments are about half the volume of a year ago, repair orders and foreign business accounting for half their volume. A prominent machinery builder received orders the first half of May exceeding those in all of April. Machine tool inquiries have perked up.

DETROIT—Car makers are releasing tool and die orders to local shops, but no large programs are up. Machinery sales consist mostly of special equipment. Small tool buying has gained slightly. Toledo auto parts factories expect to close soon for from one to three months.

CINCINNATI — Machinery orders are poor. With foreign buying continuing on a smaller scale, May's volume is reported less than April's. At Dayton, National Cash Register is busier than General Motors plants which are running two or three days a week on a limited scale.

CLEVELAND—Lean demand in auto parts and steel industries has pulled industrial operations way down. Fresh machinery bookings continue to shrink in volume, especially those from domestic sources.

PITTSBURGH—With major steel users in a seasonal decline, steel operations probably will dip somewhat during early summer. Flat rolled steel price structure has been readjusted to bring it in line with continuous rolling mill practices. Industrial production was at 55.4 on May 21, compared with 53.8 on May 7, according to Bureau of Business Research, University of Pittsburgh.

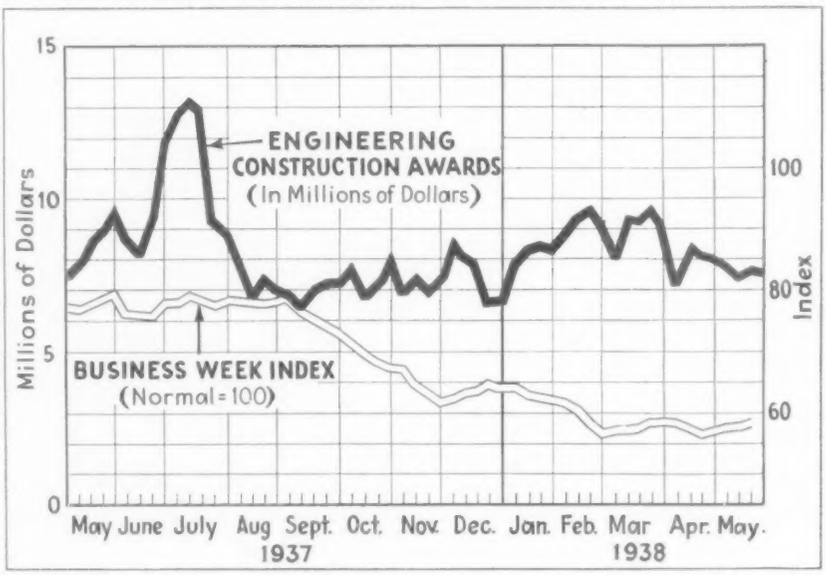
SAN FRANCISCO — Equipment sales in Southern California are better because of purchases by shops making airplane accessories. Power consumption has declined but little on the coast; in Northern California and parts of Oregon it is ahead of last year. Machinery buying generally is not expected to improve until fall.

NEW YORK—Domestic machine tool orders are scarce. Inquiries are good, but prospective buyers see no chance of getting much business themselves before late summer if then. Hence they are holding off orders. Doubt is expressed whether the government's spending program can get under way in time to do much good the next few months. French manufacturers are in the market for machinery, but British companies are likely to get most of the orders on a price basis. A small but steady flow of machine tool orders is noted from Sweden and Poland.

PHILADELPHIA—Equipment business continues in small volume. Inquiries too are light. Most prospective buyers are drifting along to see what happens during the summer before committing themselves to further capital outlays.

CONSTRUCTION VS. GENERAL BUSINESS

What appeared to be a promising upturn in April petered out, and since then engineering construction awards have slipped while general business has gained slightly



RFC Loans to Industry

JESSE H. JONES
Chairman Reconstruction Finance Corporation

SINCE FEBRUARY 18, when President Roosevelt authorized the Reconstruction Finance Corporation to resume the lending that had been discontinued four months earlier, industrial loans amounting to twenty millions have been approved, and applications for fifty-five millions more have been received.

Congress has just amended our Act again, and we are now empowered to lend on longer maturities. Thus we are in a better position to handle industrial loans for plant construction and new equipment.

Since the objective of the law is to aid business through increasing employment, we shall make our loans with that aim in view. The law requires that loans must in the opinion of our Board be so secured as to be reasonably assured of repayment.

To set certain misinformed people straight, let me say that the amendment to the Act did not change the security provisions, nor did it increase the available credit for lending. We have a revolving fund that fluctuates daily as loans are made or repaid, and our present unused borrowing authority is approximately $1,500,000,000 for all purposes. In addition we have more than $1,500,000,000 of sound assets, and collections from these may also be loaned.

To enable manufacturers to anticipate trade requirements we propose to lend for carrying inventories. These loans will involve warehousing or segregation of the inventories unless the borrower offers other suitable security.

It is generally believed, whether true or not, that many entitled to credit cannot get it from private sources. No one knows how much credit would be absorbed in this fashion, but R.F.C. is prepared to furnish the legitimate demand for it, preferably in cooperation with banks and bankers.

We want every bank in the country to make its lending facilities available to its customer-depositors who feel they are deprived of credit, and we want this done either for the account of the R.F.C. or for the joint account of the bank and the R.F.C. We are not competing with the banks. We want to help them to meet needs which they hesitate to tackle unaided, and we greatly prefer that they take some part of the loans.

I am convinced that if the banks would study the problems of potential borrowers more carefully they could work out ways of making many good loans that would profit both them and their customers. We have found ways of doing it at R.F.C., and there is no reason why banks should not use them just as we have.

At the meeting of "little business" in Washington the opinion was expressed that the small business man is being denied credit. I am not just sure where the line lies between big and little business, but I can say that with the exception of a few large loans our average industrial loan has been $54,760, and that half of these loans have been for less than $25,000. Perhaps the reason for the opinion is that the little loans are not considered news, and don't get into the papers.

Regardless of its size business operates on the same principle and faces the same employment problem. The little borrower employs the same number of people, relatively, as the big borrower. We are giving him the same consideration and we would appreciate the cooperation of the banks in this effort.

Work at Watertown

Arsenal operations are of interest not so much because they deal with armament but because of the novelty of the manufacturing problems that arise

SOME OF THE work at the Watertown Arsenal is experimental; some is more or less standard production to fill army orders. Most of it deals with special materials, usually of high hardness and toughness.

After a twelve-year period during which new equipment purchases were practically non-existent, the Arsenal in 1934 inaugurated a modernization program. At present the facilities are a combination of old and new. Some jobs are performed in the most modern manner, while others must be improvised on old equipment. In all cases, the lots are small, and operations resemble those in a large jobbing shop. Considering limitations as to the amount of tooling that can be economically justified, the methods that have been devised reflect great ingenuity on the part of the Arsenal personnel.

There is, for instance, the job of machining spherical seats for gun mounts. The ball is of bronze, and the mating bowl of steel. Both must be held to close limits and must be concentric with a second spherical bearing surface on the under side of the bowl against which a concave collar bears.

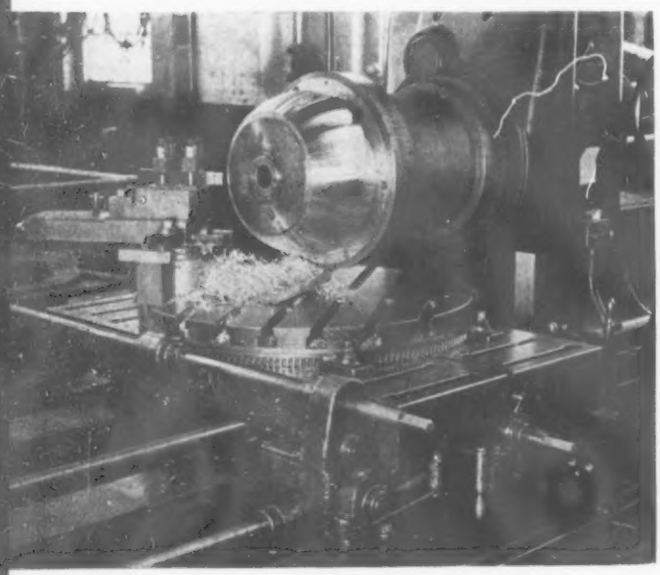
The bronze ball is turned in a lathe; the spherical portion is roughed out in this set-up. The convex surface is then finished in a horizontal boring mill equipped with a circular table having power angular feed. The tool block is set up on this table and adjusted to the correct radial distance. The work is chucked on the main spindle and rotates while the tool sweeps in an arc to generate the required sphere.

The bowl, in the smaller sizes, is machined in a vertical boring mill. A special toolblock has been devised which is mounted in the main turret head. The toolblock is pivoted and is provided with a radius arm and a link which is clamped to the side head. Operation of the side head feed rotates the block and causes the tool to describe an arc.. An adjusting screw is provided so the tool may be set for depth of cut. With the work set up on the boring mill table the device operates to form the correct spherical seat.

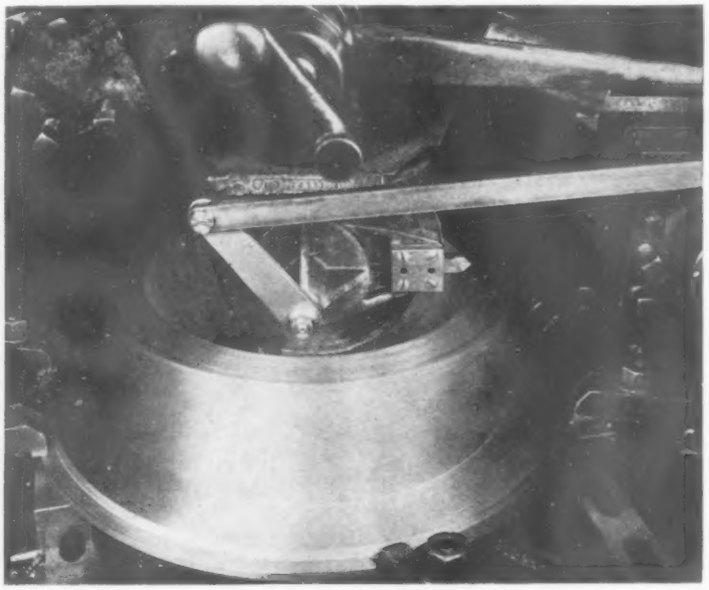
In the larger sizes the bowls are machined on a new engine lathe which has a special radius turning attachment. The tool is made to describe a radius by means of a worm-and-wheel feed mechanism which is driven by the regular feed of the machine. In addition to the tool used for cutting the concave side of the seat, a hooked tool is provided that reaches through the bore and machines the concentric collar bearing surface next to the faceplate.

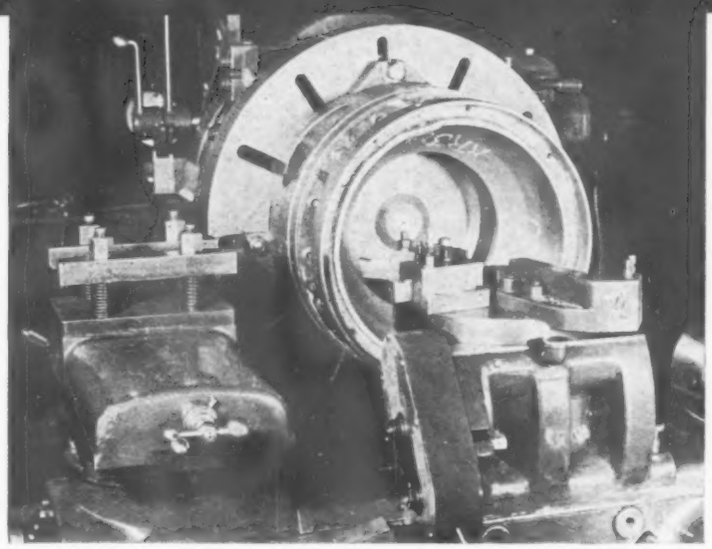
To insure a good bearing between the balls and bowls, they are lapped together. The bowl is mounted on the table of a vertial boring mill while the ball is held in the turret head by means of a pivoted link. A heavy circular strip of steel is clamped to the table around the bowl and acts as a cam. A roller attached to the ball link follows the cam, and as the table rotates, the

The ball member of a spherical seat in the gun mount is machined in a horizontal boring mill

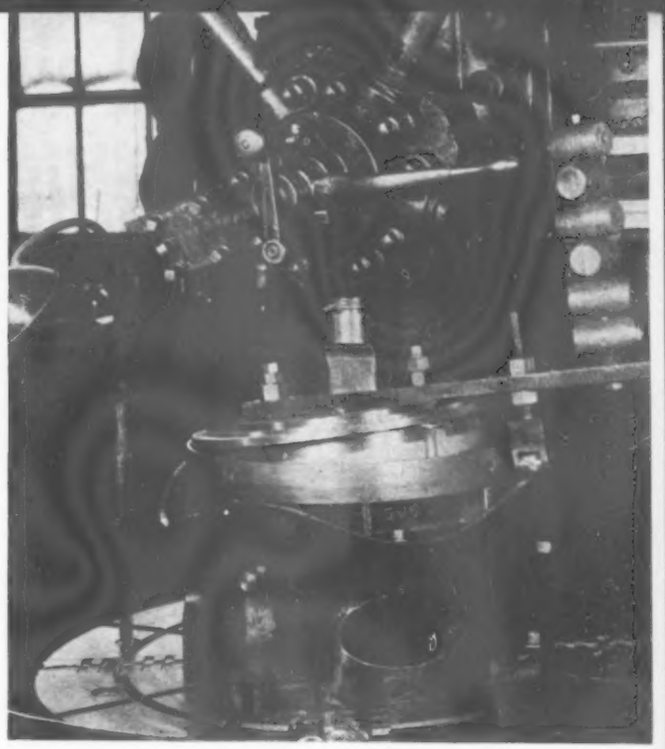


In the smaller sizes, the concave seat is formed by a special fixture on a vertical mill





A lathe with a radius-turning attachment generates the inside surface of the larger bowls



Final fit between balls and bowls is made by a lapping operation using a roller-coaster cam

ball receives a rocking motion. The combination of this motion of the ball and the rotation of the bowl gives the desired movement for lapping the two pieces together.

Another unusual operation is that of forming the throttling grooves in the recoil cylinders. The grooves start a few inches from the end of the cylinder, incline downward at about 45 deg. and then follow an irregular contour which decreases in depth until the grooves run out at the surface of the bore. Two or three grooves are used around the inside of the cylinder.

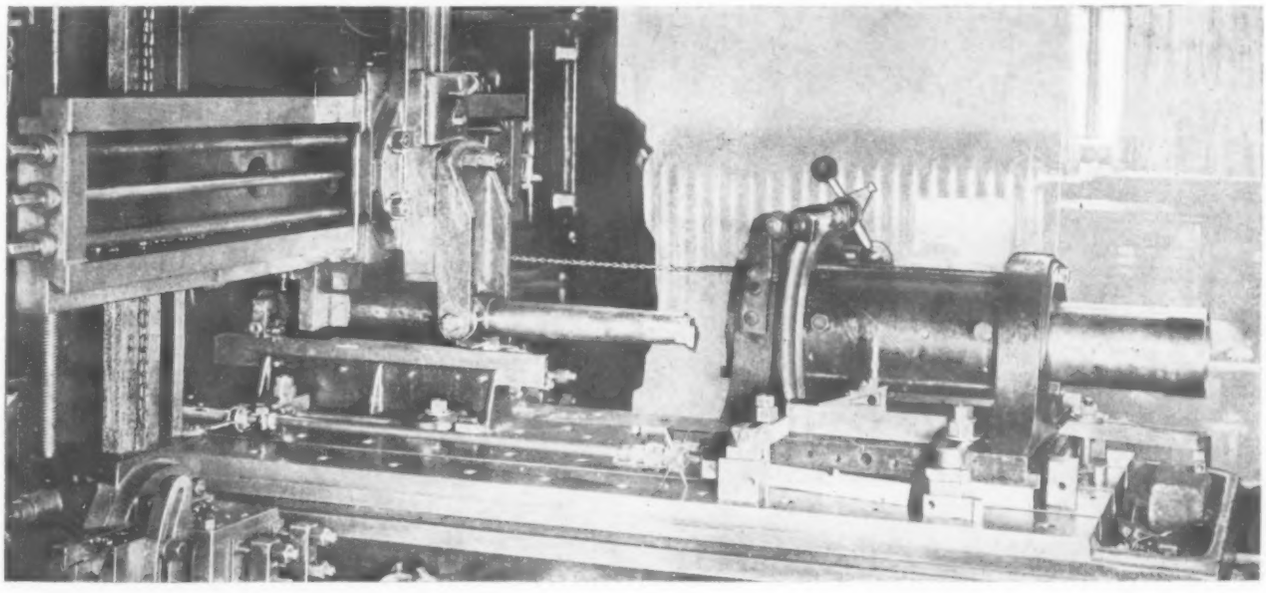
To do this work, the cylinder is set up in a horizontal indexing fixture on a planer table. The regular planer clapper box is removed, and a special head substituted which carries a rigid bar pivoted at the middle. One end of the bar carries the cutting tool, and the other end a roller that acts as a cam follower. The cam, which is the reverse of the contour desired, is bolted to the table in line with the center of the cylinder. As the planer table reciprocates the bar is rocked to give the tool the proper depth for each position of the cylinder. The work is indexed between grooves by means of a worm-and-wheel mechanism.

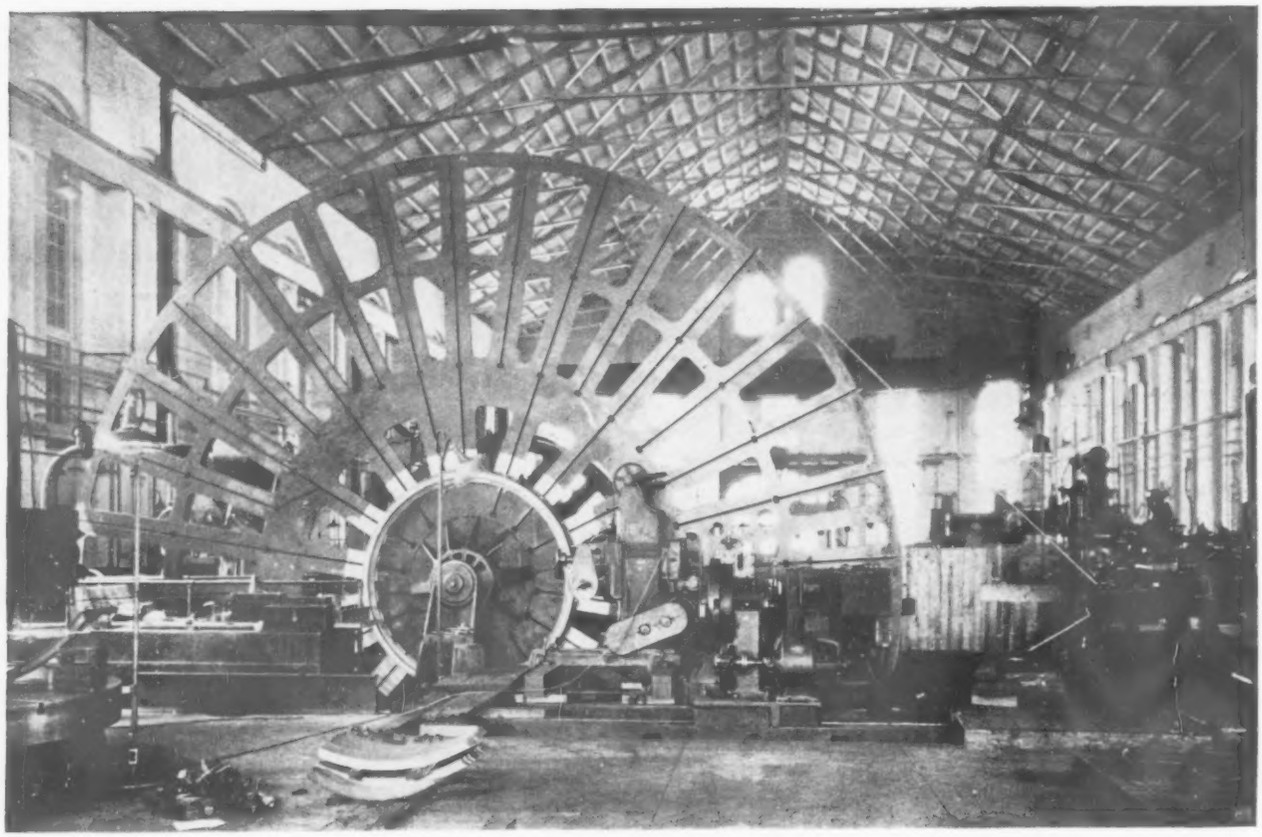
To measure the depth of grooves a star gage has been designed. For the two-groove cylinders, the gage has two fixed arms which contact the bore and two adjustable arms which are set by a cone that is moved longitudinally inside the bar by means of a lever at the opposite end. A vernier scale at the outer end gives the reading for each setting of the adjustable star points. For the three-groove cylinders a three-pointed gage is used with all the points adjustable. These gages enable the operator to measure the depth of grooves at any point along the bore.

The Arsenal has occasion to cut a good many large gears and gear segments both external and internal. For this purpose, a skeleton faceplate, some 40 ft. in diameter, has been erected. The gear rings are mounted on this faceplate and the teeth are cut by a reciprocating tool driven by a crank-arm mechanism. The tool cuts in much the same way as in a shaper except that it is arranged to follow a cam to form the required tooth contour. The faceplate is rotated by an indexing head to secure correct tooth spacing.

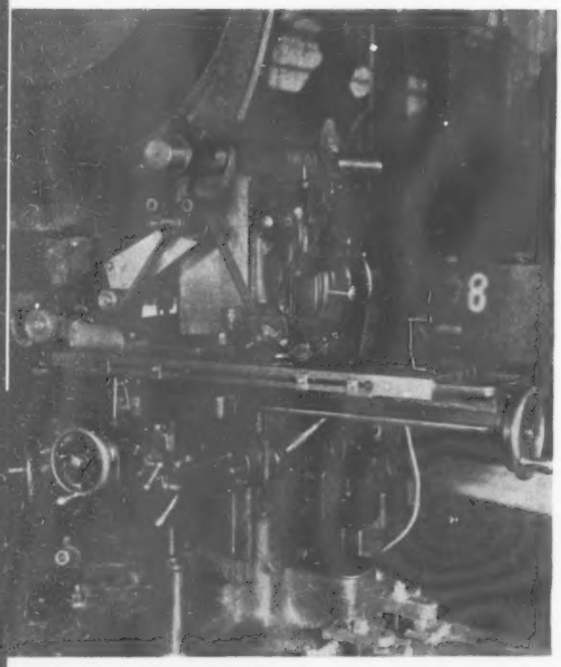
In the set-up illustrated, a milling cut is being taken across the faceplate in order to true it up. For this

Throttling grooves are cut on a planer and are measured by the star gage shown on the planer table





Large gear rings are cut on a special machine shown while a truing cut is being taken across the faceplate



Smaller gear rings are milled in another special set-up using a multi-tooth cutter

job a milling machine has been temporarily mounted on the bed to take the cut.

Feed motion was supplied by a rope passed entirely around the large faceplate and driven from a drum at the right. This set-up provides a good example of the unorthodox methods often used in the Arsenal to meet special problems.

For gears a little smaller in diameter but still too large to be cut by the Arsenal's standard gear-cutting equipment, another arrangement has been improvised. The indexing mechanism of an old Gleason machine is set up on a baseplate to provide the mounting for the gear. On the baseplate a milling machine is bolted with a special cutter spindle mounted on the end of the table.

For the particular job illustrated, the cutter used cuts five teeth in an indicator gear at once. The use of this tool divides the number of indexes required by five, resulting in a large saving since there are 1,800 teeth in the gear.

A right-angle milling fixture in a horizontal boring mill machines an otherwise inaccessible spot

The milling machine is removed and a shaper substituted for cutting coarser pitches and internal gears. The entire set-up was originally devised to meet an emergency job, but it has since been used on a large number of gears.

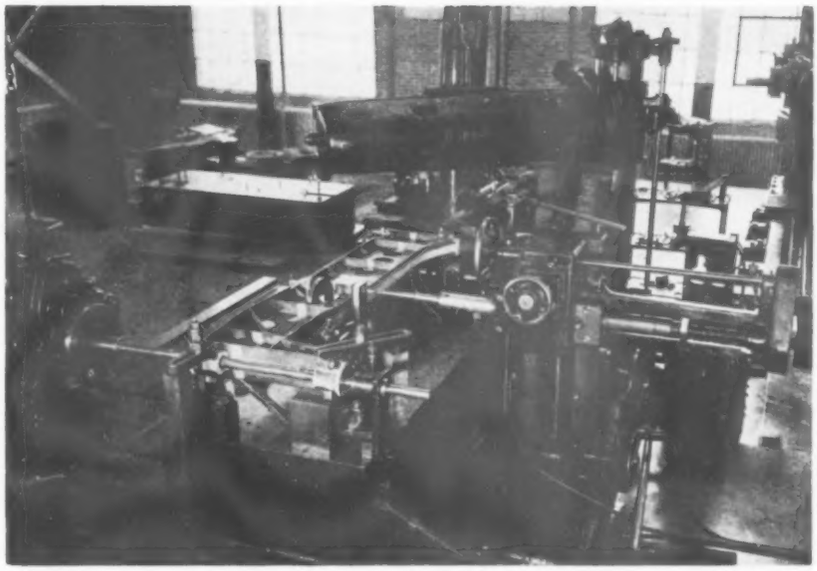
A flat surface on the inner face of the gun cradle is milled with the use of a right angle fixture. The fixture is set up on the table of a horizontal boring machine and provides for boring the cross holes as well as the milling operation. The tool head is driven by the machine spindle and fed forward by means of the spindle feed. Rotation of the spindle is transmitted to the cutter through a pair of bevel gears. The tool head is guided in V-ways along the base of the fixture. The arrangement solves the problem of machining an inaccessible surface and also insures squareness between the holes and the milling cut.

Outriggers require a number of drilling, boring and reaming operations that consume considerable time. Part of this time is consumed in the set-up and part in the machining. Where a sizable lot of these pieces is being put through it has been found advantageous to group

several machine tools on one baseplate around the jig designed to held the outriggers.

The illustration shows one of these pieces, which incidentally is built up from steel plate and turned hubs by welding, being operated upon by three machine tools. The work is set up in a jig which locates the main holes while the cuts are taken by two horizontal boring machines and a radial drill. This arrangement means one set-up, instead of three.

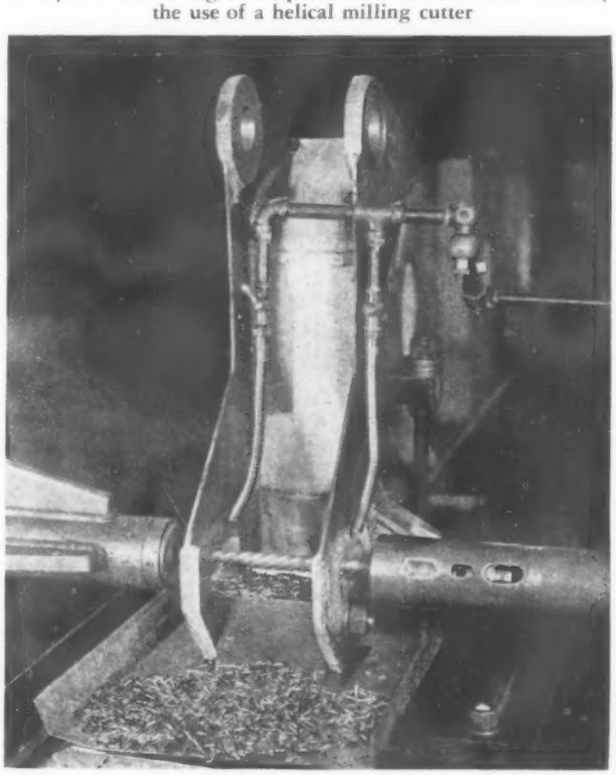
A slow slotting operation has been replaced by milling on the intermediate outrigger, also of welded construction. The work consists of machining two tapered holes which must be of the same size and in line with each other. When this was done by slotting, the operation was a slow one, and it was necessary to turn the piece over after one side had been slotted which involved some difficulty in keeping the holes in line. The work is now performed in a horizontal boring, drilling and milling machine with a helical cutter supported at both ends. A hole is drilled to start the cutter and then, using the regular machine speed, a cut is taken on all four sides of the slots by simply following around the sides of the rectangle. The corners are left round as the design was altered to accommodate this operation.



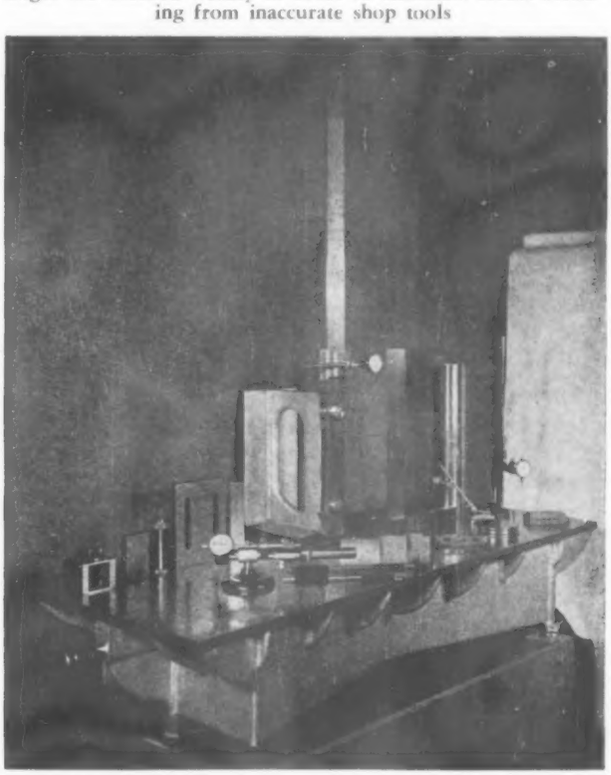
Machine tools are grouped in semi-permanent positions on long runs

Part of the arsenal's success in turning out accurate work is due to its care in maintaining precision tools. All gages, squares, straight edges, micrometers and indicators are brought into a special crib once a week for inspection. It has been found that this practice has effectually reduced the volume of work exceeding engineering tolerances and removes any question as to the accuracy of the workers' tools. The gage crib is backed up further by a constant temperature gage room equipped with precision measuring devices of the latest design. The illustration shows some of the work handled by the gage crib laid out on a surface plate. The vertical fixture in the center is used for checking squares. The indicator is first set up using the ground bar at the right for a master and then slid up and down the straight edge to check the accuracy of the blade of the square. It will be noted that the surface plate is supported by means of a three-point suspension.

The job of machining two tapered slots has been facilitated by the use of a helical milling cutter



Gages are checked weekly in order to eliminate errors resulting from inaccurate shop tools



Steps in Making a Giant Horse-Shoe

Machining a 46-foot circle on an 18-foot boring mill is an out of the ordinary job. Here's how Westinghouse worked it out for the mounting of the Mt. Palomar 200-inch telescope

D. B. CHARTERS
Manufacturing Engineer, Westinghouse Electric & Manufacturing Company

TURNING a 46-ft. piece of fabricated steel on an 18-ft. mill was recently accomplished when the Westinghouse Electric & Manufacturing Company machined the horse-shoe shaped mounting of the 200-in. telescope now being built for use on Mt. Palomar by the California Institute of Technology.

This mounting, one of the largest undertakings of its kind from a manufacturing standpoint, is in the form of an incomplete circle 46-ft. in diameter, 4½-ft. thick with an opening 22½-ft. wide in the circumference which extends into the center to a half-circle with a diameter equal to the width of the opening.

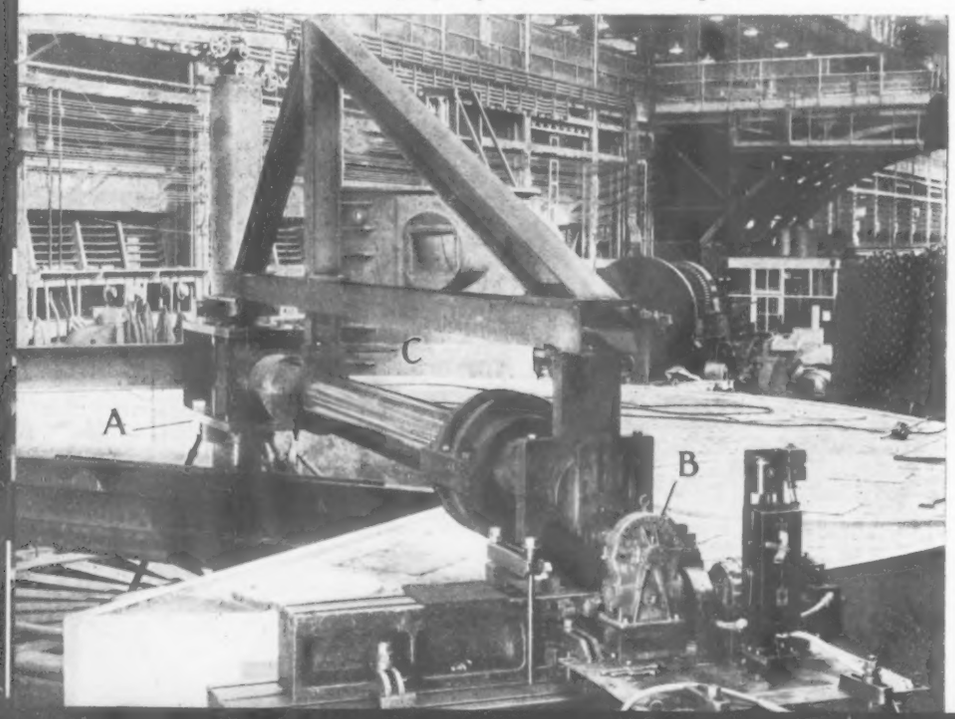
It was fabricated at the South Philadelphia Works of the Westinghouse Company and consists of three parts, known as the east horn, west horn and center portion. The three parts of the complete structure were machined complete at South Philadelphia before being sent to East Pittsburgh for final boring. As regards partings and bolts, the dowel pins were fitted and the pads for attaching to the boring mill were welded in place, drilled and tapped to fit the outriggers as provided on the boring mill at East Pittsburgh. Each of the parts weighs somewhat over 100,000 lb. so that when bolted together it represents a total weight of approximately 320,000 pounds.

The mill at East Pittsburgh which was used for this turning and facing job is what is called a floor mill, since it does not have the columns and crossrail of the conventional boring mill, but instead is only a revolving table, practically at floor level, with the driving mechanism in a pit under the floor. The original table is 18-ft. in diameter, but at the time the intake gates for Boulder Dam were built by Westinghouse an auxiliary track with outriggers had been provided to revolve parts 32-ft. in diameter. The 46-ft. diameter of the "horse-shoe", however, made necessary a second track with longer outriggers.

The track was manufactured in sections on approximately a 43-ft. diameter, machined on the bottoms and ends, bolted and doweled to the floor about the old table and machined in position. In order that conditions throughout should be as near actual as possible the table was loaded with about 150 tons of material, while the track was being machined so that any movement of the floor plate would repeat on the finished operation on the "horse-shoe". The outriggers and shoes were then put in place on the track and the three parts of the mounting were placed on the mill in approximately their final position, just clearing the pads on the outriggers upon which they were ultimately to rest. The pads were then faced, turned and drilled for the "horse-shoe" under the same conditions as would obtain in actual work.

The three parts were then bolted together in position on the mill. During this time the tool heads

Fig. 1—Compression and tension members used to spring the mounting into loaded position. *A*, Compression member; *B*, Bolts with turnbuckles; *C*, Brace to center post; *D*, Boring bar to carry facing tool; *E*, Facing tool; *F*, A-frame support for boring bar; *G*, Hydraulic cylinder for springing the "horse-shoe"; *H*, Measuring bar on compression member; *I*, Start dog-cross-feed; *J*, Stop dog-cross-feed; *K*, Switches-cross-feed; *L*, Outer track; *M*, Top measuring bar on top bolt.



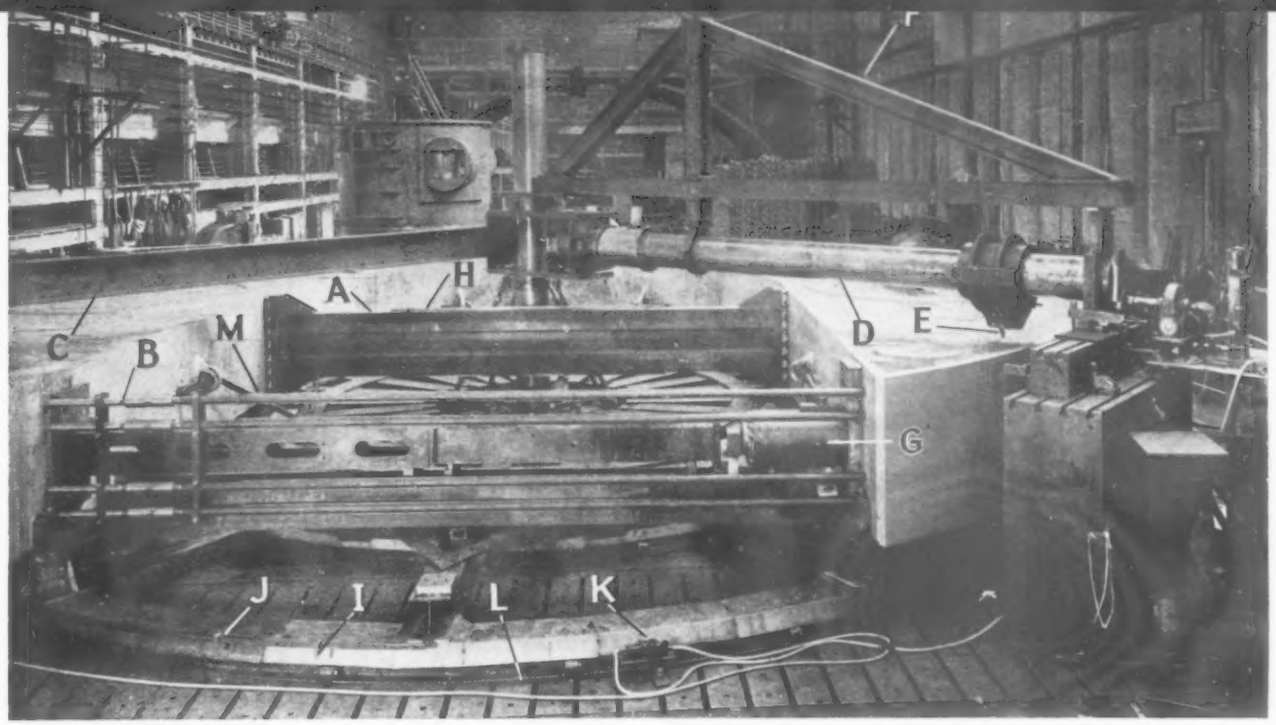


Fig. 2—Cross feed of boring tool. *A*, Bar bearing—center post; *B*, Reduction gear between motor and cross feed screw; *C*, Shims for correcting bar sag

remained in the same position with reference to the mill as they were to be during the final operation.

Fig. 1 gives a good idea of the boring mill, extra tracks and the large boring bar which was arranged for facing the top. The long, heavy boring bar sagged very perceptibly; hence the need of the A-frame which will be seen just above it. Adjustment was made between the A-frame and bar by means of shims in order to get the bar level. The brace which can be seen extending 90 deg. from the center support was to prevent any movement caused by cutting pressures. The cross feed arrangement was with limit switches, motor and reduction gears. The switches were actuated by dogs fastened to the table. Fig. 2 shows this feed.

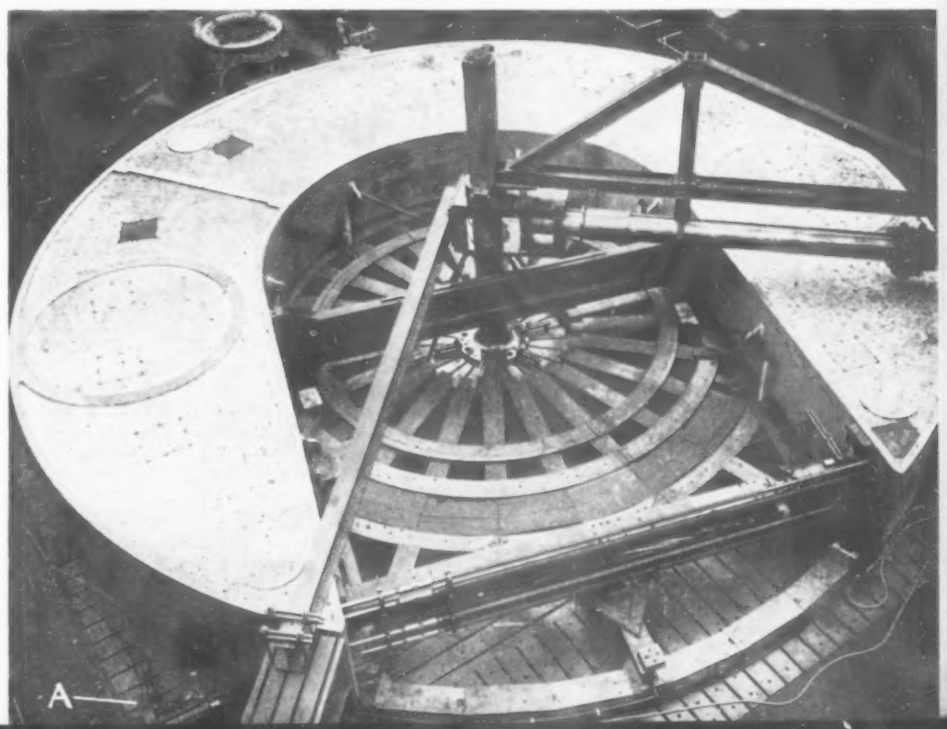
Since the telescope mounting will carry a heavy load in service it was necessary to spring it to approximately its loaded condition before turning so that when in use the bearing surface would be round and true. This was accomplished by means of a compression member, which can be seen in Fig. 3 near the center support, and four tension bolts with turn buckles. In order to get the compression members to function properly it was necessary to spring the horns outward, set the screws in the compression members, then reverse the procedure and pull in on the tension bolts. Forces were calculated by measuring compression and stretch of the corresponding members. A careful look at Fig. 3 will show provisions made for measuring the movements by means of feeler gages. The hydraulic jack for springing open the horns is still in position although the pump has been removed.

Precautions were taken to prevent overloading the bull gear on the mill. The maximum permissible horsepower input was calculated and the overload trip on the motor control was set accordingly. A power winch was bolted to the floor alongside the mill so that a considerable independent force could be exerted upon one of the outriggers. However, if the mill had been stationary for some considerable time it was necessary to get the further assistance of an overhead crane to reestablish the oil film.

The tolerances agreed upon by the Institute were as follows: Top surface not over 0.005 in. concave, convex or conical, bearing on outer diameter within 0.005 in. of square with top surface. The true bearing surface on the outer rim is 30 in. wide and is round within 0.0025 in. and free of tool marks. A 15 hp. vertical grinder was used for finishing this surface.

The operation of turning and facing was of considerable duration since the mill moves but thirteen revolutions per hour or about 30 ft. per min. cutting speed, which seemed fast enough under the circumstances. The part as fabricated was within $\frac{3}{32}$ in. of round, on the rough surface.

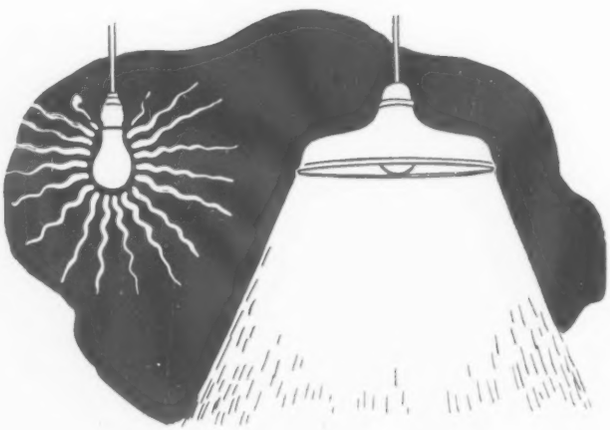
Fig. 3—General arrangement of mounting in boring mill. *A*, Starting winch



Worth Seeing

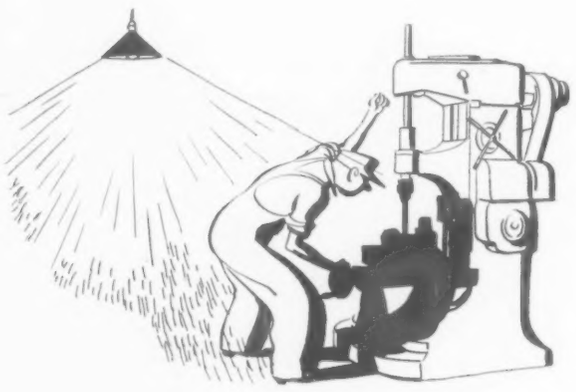
A DIM SHOP is likely to turn out drab work. A light shop makes good work worth looking at; it brightens the finish and the disposition alike; it promotes precision and aids in avoiding accidents.

Most shops must depend on artificial lighting for part of the day or part of the year. Busy times bring extra shifts which operate during the night hours. The points made on these pages suggest a more effective use of light. An inspection of shop lighting plus a small outlay may bring big returns in better work.

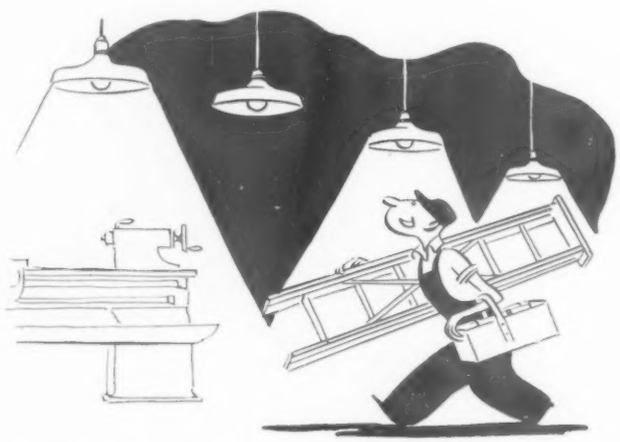


1 Bert Batt works with a bare lamp. Light that should be directed on the work is wasted on the walls and ceiling, and shines in Bert's eyes. Bert may not know it, but it's eye strain that makes the afternoon hours seem so long. A suitable reflector will more than double the light on the work

2 Sam Stigmatic uses a reflector but has the light on a line with his vision. When he looks around the dimly lit shop and back to his work the glare causes his pupils to contract violently, impairing his sight. Under proper illumination the pupil is well expanded.



3 Coming events may cast their shadows before them, but Joe McMurk would be better off if his shadow didn't fall on his work. Lighting fixtures located to minimize shadows will help him keep out of his own light. Shadows should never be so dense as to interfere with good work

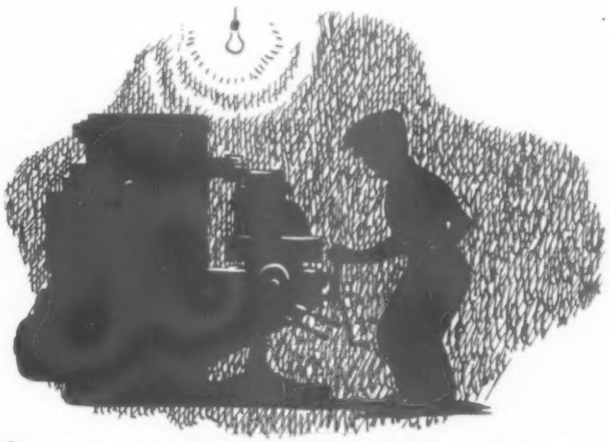


4 Pete O'Paig, the maintenance man, must make it his own or somebody else's job to see that all lamp sockets are filled. The lighting system will be efficient only if used as originally planned. Dead lamps or empty sockets create blind spots throughout the shop

5 Even before they burn out, lamps get too dim for useful service. It's better to pension off units with declining candle-power than to drive them to the last watt. Lamps that burn too long are a waste of human and electrical energy

6 Jerry Grope used to let his lamp and reflector get dirty, losing original effectiveness of the fixture. Dust and grime accumulated so what was once a healthy glow became pitiful gleam. Here he is turning over a new leaf

7 Joe Glimmer, the electrician, must use his head when changing or adding new sources of light. A well designed system may become spotty because of thoughtless alteration. If Joe keeps original light levels in mind he can retain them

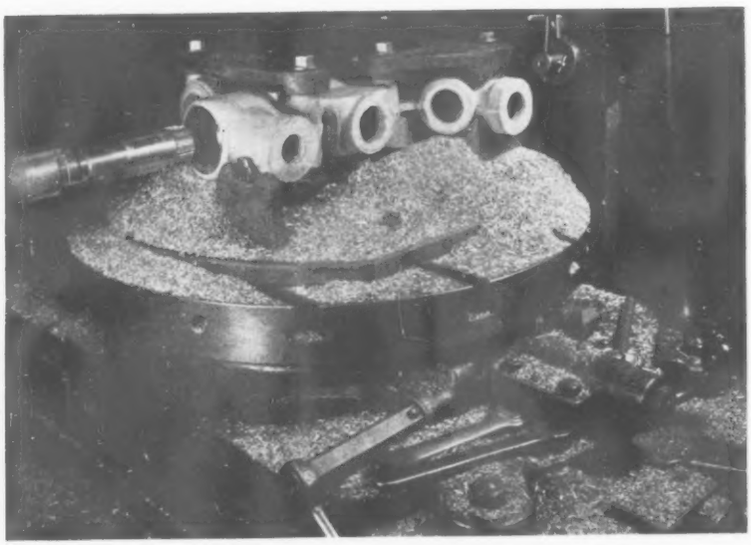


8 Phil Fogg looks depressed and gloomy, and there's a reason. The light level is too low because of incorrect mounting and spacing of fixtures. A light meter is a handy instrument that will quickly tell the story

9 Fred Primer, the painter, can do his bit, too. Clean, well painted walls and ceiling enhance the over-all efficiency of the lighting system. They will reflect a much greater proportion of the light to the working area than when they are dull

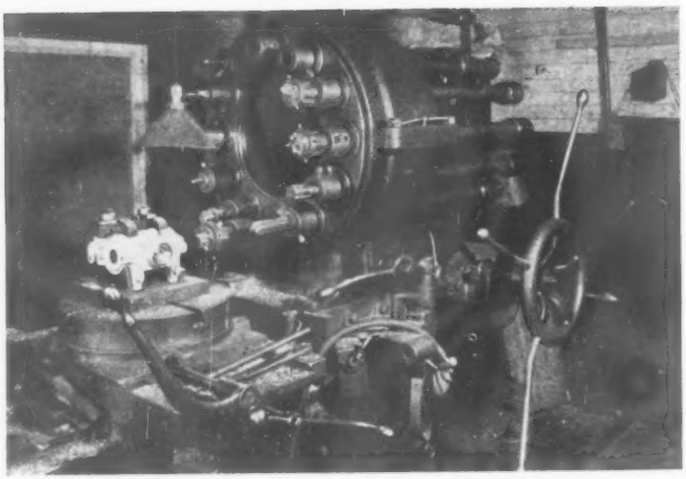
10 Harry Hayes works on bright parts that tend to dazzle him after a day's work. A diffusing bulb or shade will break up the direct beams and give him good illumination without discomforting reflection

Boring Brass Injectors



Instead of using turret lathes for boring brass injector bodies, the Nathan Mfg. Company has long done this work on Lucas horizontal boring machines. Bodies are clamped in cradles on the circular machine table, the back end of the work being centered by the swing gage, or caliper, in the rear support. All locations are secured by the cross table movement and the circular table. A special stop aligns the center of the table with the centerline of the spindle. A scale on the table cross-slide enables the operator to bore all holes at one setting

A great variety of boring bars, cutters, seating tools and taps are kept in holes in the bench adjacent to the boring machine. This arrangement is not only convenient but allows ready examination of the tools' condition at any time. All threaded holes are retapped by hand after removal of the work from the machine, to overcome the effects of expansion of the metal from heat generated in the machining operation



A special Bullard twelve-spindle machine is used to machine hydrostatic lubricator bodies. The piece shown is a comparatively small lubricator body, but larger ones can be handled on this machine. Each spindle carries a different tool, and travel of each tool is regulated by a stop collar on the bars

DAD SAYS

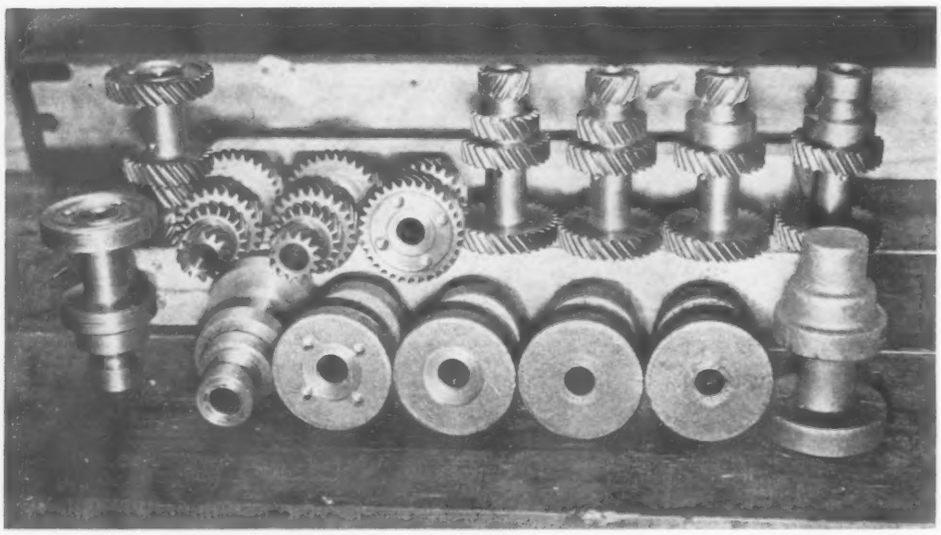
It's People You're Loyal To

THE LAST few days the boys have all been talking about the "Old Man." He's retired now, and living on a farm down south, but he was in town last week and came over and spent the whole day walking around the plant; and how the fellows enjoyed seeing him again.

The Old Man was in charge here for about ten years—up to three years ago—and it sure seemed like old times to have him around, except he was quieter. When he was the big boss he would go through the plant cursing and hollering so loud you could hear him all over the place. Just like as not he'd fire you if your job wasn't going right; but if it wasn't your fault you could always get your job back by going over to his office and explaining to him when he got cooled down.

The whole gang liked the Old Man. They liked him because he had guts and because he was fair, but more than that they liked him because he was just downright interested in people—his people—and was always out in the plant with them. He wasn't afraid of getting his hands dirty either. He was the boss all right, but he was human. Now, some men like people but can't be the boss, others can be the boss but just seem to hate people, but a man—like the Old Man—who can be both the boss and be human, is sure to have a gang that will go to Hell for him.

The men in the shop are still working for the same company. Our wages are better and our work is easier, but it's not such a good place to work since the Old Man left. The new manager is much smarter, I hear—of course I've never talked to him—I hardly ever see him—but you can't be loyal to just brains. It's people you really work for; it's people you're loyal to; and it's people that you would go to Hell for—or tell to go to Hell.

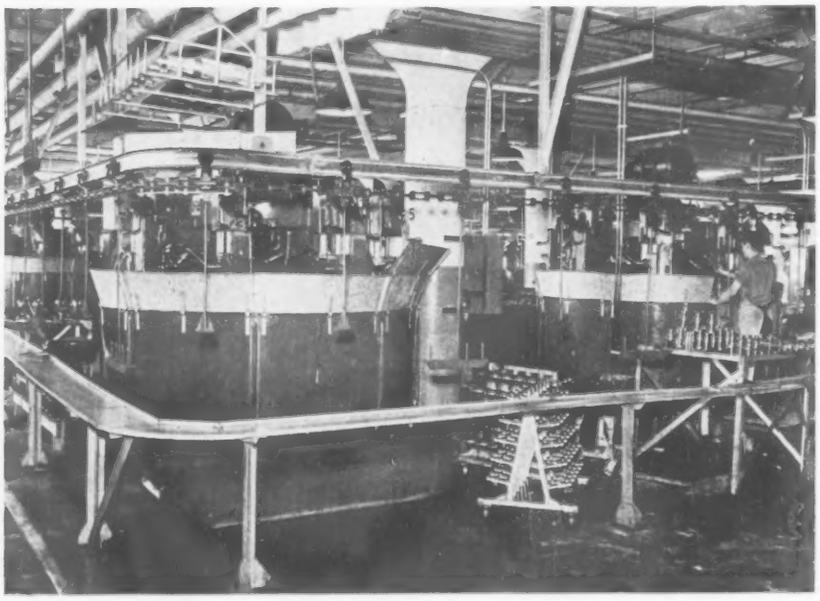


Sequence of operations on Dodge transmission gears is shown here. Both rows are read from right to left, final operations being shown in the upper row

Modern Tools Make Dodge Transmission Gears

Kokomo plant is laid out for smooth flow of work from unloading dock to final assembly

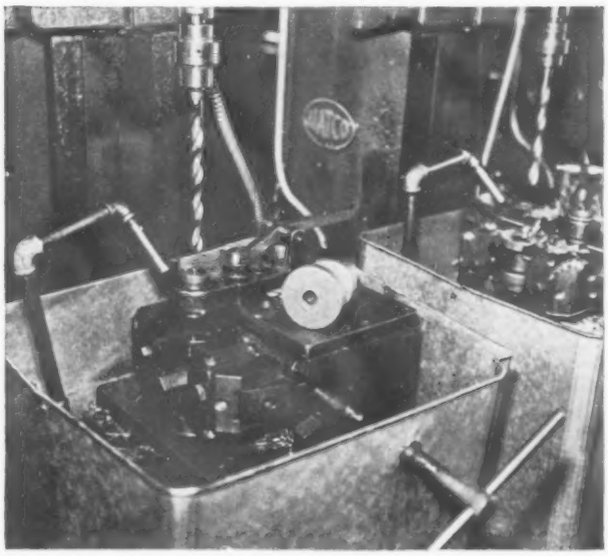
ATHEL F. DENHAM
Detroit Editor, American Machinist



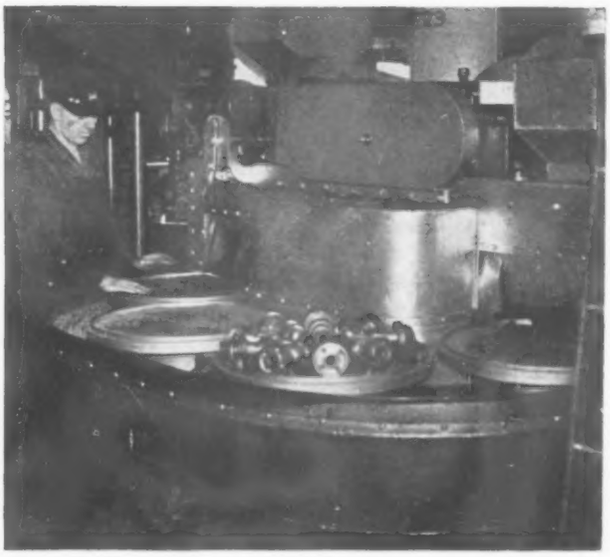
A battery of rotary automatic hobbers semi-finish the two large gears on the cluster gear, as well as other gears for the Dodge transmission

TAKEN OVER a year or so ago after a long period of idleness, the Haynes plant at Kokomo, Ind., has been revamped by Chrysler Corporation for the manufacture of Dodge transmissions. Here, the first floor of the four story building is devoted to the production of gears, while transmission cases and other parts are machined on the second floor. Final assembly operations also are performed on the second floor. The two upper floors are not used at present, being available for future expansion.

Layout is such that work on cases, gears and other parts begins at the loading dock at the rear end of the plant and continues forward to final assembly and test. The only instances where material in process moves in the opposite direction is in the case of a conveyor taking machined gears to the heat-treating department and another that delivers finished gears to the assembly line on the second



Single-spindle drill presses are used for rough drilling bores of cluster gears. Fixture locates the forged blank from the outside diameter, the top and the bottom



Heat-treated gears, shafts and other parts are cleaned in an indexing rotary-table sand-blasting unit. Operator only has to load and remove the parts

floor. Structure of the building is such that natural lighting is provided for all floors.

In machining transmission gears, virtually all operations are carried on with reference to the hole in the hub. First machining operation on these gears is finishing for location of the center bores. Where necessary, as in the cluster gear, the bore first is rough drilled and then broached. Standard, hydraulic horizontal broaching machines are used for broaching the bores. Two of these machines are fitted with helical broach bars so that internal helical splines can be machined for accurately locating the teeth of certain gears with reference to the splines.

Originally developed for car springs, Chrysler's "Mola" steel has been adapted to gears because of its high tensile strength and resistance to fatigue. This is a carburizing steel and is not water quenched. Sequence of operations on the transmission cluster gear is shown in an accompanying illustration. The bore first is rough drilled, then broached. The large end next is spot faced and the bore is chamfered on a drill press having tools equipped with roller pilots.

After performing a similar operation on the small end, four $\frac{1}{2}$-in. holes are drilled in the large end. These holes are used in subsequent operations for driving the gear. Following this operation, the blank is rough and then finish turned all over on automatic lathes, the blank being held between centers. Small end is faced during this operation.

Next major operation is counterboring the undercut in the large end. This is done on a turret lathe equipped with a three-jaw, air-operated chuck. Two undercuts are machined in the center bore at the same time, in order to facilitate a later finish grinding operation. Following this operation, the next step is to machine the blank to length. This is done on a lathe, the piece being mounted on an arbor to insure having the ends square with the bore. Gear then is checked for run-out and refaced, if necessary, in another lathe. Heat number and date are stamped on the gear, for metallurgical control, at this point.

Ground Hobs for Gears

Blanks then are delivered to a battery of automatic rotary hobbers for semi-finishing the two constant-mesh gears. Only Class A ground hobs are used, so as to reduce metal removal in subsequent shaving operations to the minimum. The reverse and low-speed gears on the cluster are shaper cut in separate operations. Blanks are mounted on arbors for gear hobbing and shaping.

Gear teeth next are chamfered on a battery of two-spindle machines, then they are burred and hung on a conveyor for transfer, through a spray washing unit, to an inspection group. Here they are mounted in hand rolling fixtures for checking against master gears for eccentricity and size.

Cluster gears now are ready for finish shaving, following which they are checked in the soft condition with a master gear as a means for controlling subsequent heat-treatment. Base helix angle and involute form also are checked at this time to permit gaging heat-treating distortion as well as the accuracy of preceding operations.

Following a second washing operation, the gears are delivered to the heat-treating department by conveyor for carburizing. Heat-treated gears are washed and sand-blasted, then checked for eccentricity. When necessary the clusters are straightened with a 20-ton press. A hand-rolling fixture is used here for matching the gear with a master.

Gears next are returned to the machine shop where all teeth are burnished. Following this operation, both ends of the center bore are finish ground on a reciprocating grinder having automatic sizing features. For this operation, the gear is held in an external chuck having pins which engage gear teeth on both the large and small end of the cluster. Final operations consist of grinding the faces at each end to length on rotary surface grinders. The finished gear then is delivered by conveyor to the transmission assembly line on the second floor.

There are two rather interesting operations on the spline shaft. One consists of electric annealing the threads in the end of the shaft after heat-treating. The other is the finish grinding of the helical splines. Other gears are carried through manufacturing processes similar to those employed for the cluster gear. Certain parts are copper plated before finish turning so as to prevent carburizing of those sections that are to remain in the soft state.

Plating Practice on Zinc Die-Castings

Die-castings for automotive use must be cleaned and plated under precise technical control

B. F. ROBINSON
Superintendent, Plating Department
Continental Die Casting Corporation

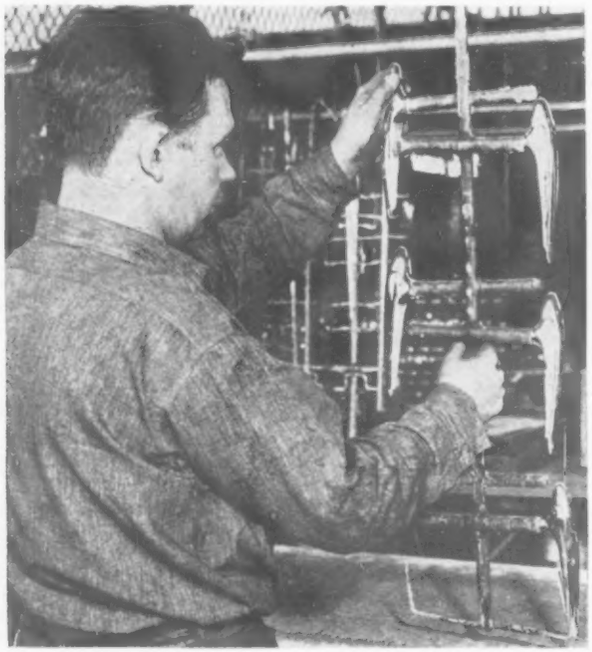
PRODUCTION of an enduring plate on zinc-alloy die-castings is a highly developed art. It is not difficult to deposit a good plate, but to do this economically and dependably day after day on a large variety of castings demands not only knowledge of advanced plating practice, but care in the control of a great variety of conditions. Technically trained personnel and highly developed equipment are essential.

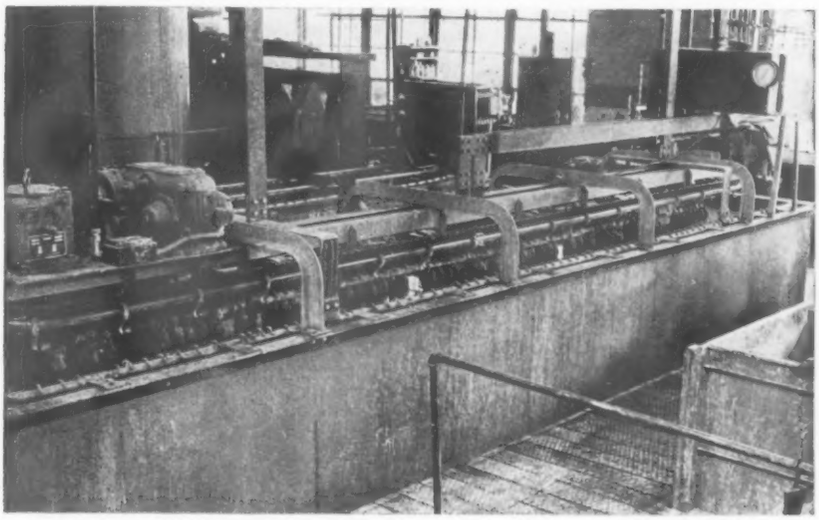
The Continental Die Casting Corporation has taken steps to avoid plating troubles by providing, as a part of its modern plant, a plating department having the latest types of equipment for expeditious and economical plating of die-castings produced in the same plant. Here, every effort is made, first of all, to produce castings having the smoothest possible surface well suited for plating as described previously (*AM*—Vol. 82, page 372) and, secondly, to do a high grade job of plating. A large proportion of the castings produced are for automative applications in outdoor exposure, which demands an excellent plate both as to initial appearance and enduring properties.

Care is exercised in polishing and buffing, both as to workmanship and materials used, for these contribute much to an acceptable plate. Grinding is done only at parting lines, as a rule, and the smooth initial finish of the casting minimizes the amount and cost of buffing. Buffing compounds are chosen to avoid high cleaning costs and to insure their complete removal in the cleaning

After buffing, the die-castings are placed in wooden racks to avoid scratching, and the racks are placed in trucks

Plating racks are designed for each piece. Sharp points are arranged to "bleed" into adjacent castings or into part of the rack to avoid "burning"





Bright nickel plating is done by the Harshaw method in a semi-automatic conveyor type of tank through which parts move at 2 ft. per min.

which precedes plating. All castings pass through a department where they are closely inspected before plating, which follows buffing as soon as possible. Plating is usually done the same day, so that the chance of accumulating a film of oxide or dust is avoided. All handling is done with clean gloves. Castings are placed, before and after plating, on wood racks to avoid mechanical scratching.

Plating racks for carrying the parts through the respective operations are designed for each piece. Center bars of racks are of copper and side arms are of spring brass. The racks are coated with stop-off lacquer, except where contacts with the castings are made. Separate racks are used for chromium plating, as otherwise chrome salts might be introduced into nickel solutions and result in a dull plate and peeling. Care is used to insure a good contact at supporting points to avoid possible double plating with consequent tendency to chip or peel. To avoid "shading", parts are kept at least 1 in. apart, except at sharp points where "bleeding" is required. In this case, the spacing at the points may be ½ in. so that one part will bleed into the next one. In cases where points are necessarily isolated, bleeders are provided on the racks adjacent to them. This practice avoids concentration of the current at the points and consequent burning of the plate. Plate is kept stripped from exposed contacts on the racks. Care is used to insure proper current capacity in the rack.

Prior to plating, castings are not degreased, as this may leave solid deposits from the buffing compounds. Dependence is placed rather on the use of commercial alkali cleaning compounds in an electrolytic bath, which follows a presoak of three to five minutes in a special soaking solution used at boiling temperature. In castings with knurled or serrated surfaces, however, brushing in kerosene (because it does not evaporate and leave hard deposits) is sometimes done to loosen solids left in crevices after buffing. Efforts are made to minimize the quantity of grease used in buffing, and the compounds selected have no grease of high melting point which might not be removed in hot electrolytic cleaning.

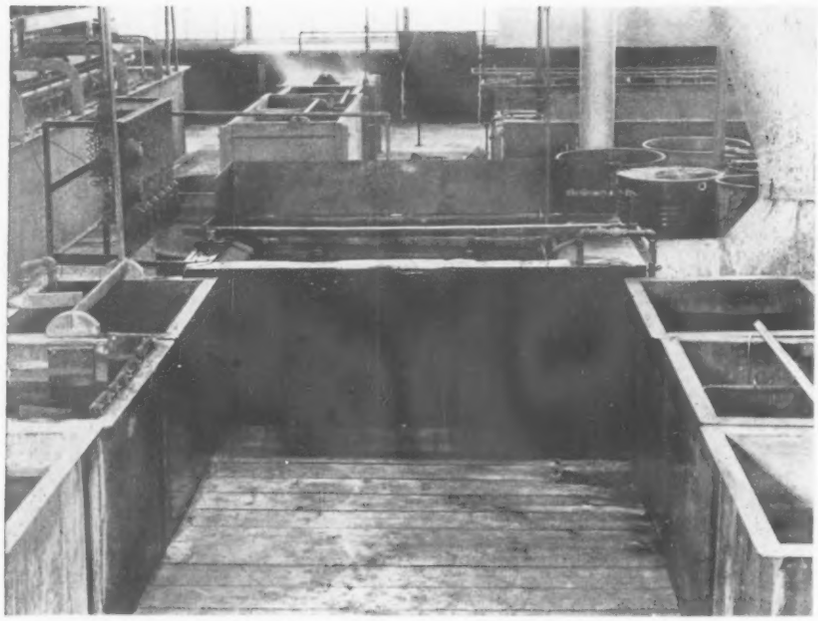
Cleaning Methods

The alkali cleaner can be checked by maintaining a *p*H of about 11 to 13 to avoid chemical reaction on the casting, but checking in this case is done by titration. The solution is maintained at 200 F. to soften grease. Care is used to keep the tank free of castings knocked off the racks accidentally, to avoid plating out metal from the dissolved casting. After pre-soaking, electrolytic cleaning is done in five to ten sec. under a seven-volt potential which produces the desired gassing with consequent scrubbing action needed to insure good cleaning. Solution is tested by titration with a methyl-orange indicator and with phenolphthalein twice a day. These tests determine both the total alkalinity and the presence of the weak alkalies so desirable in the cleaning of zinc die-castings.

Cleaning is followed by two cold water rinses, the second involving a dip and a spray. The latter is directed across the top of the tank (which is thus kept clean) and toward an overflow into the first rinsing tank. Next comes a dip in a 1 per cent (by volume) solution of hydrofluoric acid which is strong enough to produce gassing immediately upon immersion. Free gassing is essential as an indication that the alkaline film has been completely neutralized. This is especially important on castings which have some parts enameled after plating, as otherwise the baking which is given the enamel will cause the plating to lift or blister. Hydrofluoric acid is used because it does not darken the casting. The time of dip is approximately four to six sec. and it is followed by a thorough cold water rinse, because it is necessary to avoid introduction of acid into the copper plating solution.

Copper plating is essential for the bright nickel plating which follows and a minimum thickness of 0.0003 in. is maintained. This prevents sufficient dissolving into the zinc to result in subsequent peeling of the plate. A Rochelle-salt type of cyanide bath is used. Copper is maintained at 2 to 2½ oz. per gal. and free cyanide at about ½ oz. per gallon; Rochelle salts between 6 and 8 oz. per gallon. In general, it is unnecessary to add sodium carbonate to the metal solution, because in normal operation the carbonate quickly builds up to the desired amount. It is not allowed to build up sufficiently to precipitate out, however, as this would produce a rough surface. Copper content is checked twice a day and the cyanide three times a day. Temperature is maintained at 120 to 130 F. A drop of 3 volts is maintained between anode and cathode, giving a current density of 20 to 40 amp. per sq. ft. Racks are suspended from agitated rods, the tank being steel and equipped with connections to a suction system which draws off fumes. Copper-anode area is limited. Also, to keep copper content within the limits named, some steel anodes are used. The solution needs no sodium perborate or hypo. When the solution requires cleaning it is allowed to settle at night and is decanted to eliminate precipitates. Plating requires about 12 min.

Following copper plating, the work is given two coldwater rinses, a dip in a 10-deg. Baume solution of sulphuric acid, another cold-water rinse and is then ready for bright nickel plating. This type of plating is now used exclusively at Continental, largely because there is little need for buffing before chromium plating. Buffing costs are a most important element in over-all plating costs. Bright plating is done by the Har-



There are two chrome plating units of which this group of tanks is one. Electrolytic cleaning and rinsing are done in the tanks at the left; chrome plating follows in the central tank, and final rinsing is done in the tanks at the right

shaw method which demands close chemical control but, when this is maintained, the process is productive of excellent results.

A semi-automatic conveyor type of tank is employed. The conveyor is set to travel 2 ft. per min., which results in sufficient agitation to assist in producing a bright finish, and which serves also to control the time of plating. The work is put in and taken out at the same station. The tank is rubber lined and fitted with a lead coil for steam heating to a controlled temperature of 140 F. In each gallon of solution there are 40 oz. of nickel sulphate, 5 oz. of nickel chloride and 5½ oz. of boric acid. To this there are added the Harshaw solutions which include, besides the brightening agent, an organic carrier and a non-pitting agent, all of which have to be carefully maintained. The amount of brightener is varied slightly with the size and shape of castings being plated and is checked hourly. Too much brightener may result in grayness of plate. The carrier and non-pitting agent are checked each two weeks. A *p*H of 3 is normally held, but if pitting occurs it can be reduced to 2.5 and the temperature may be raised temporarily to get rid of dissolved gasses.

Water is added at night and the solution stirred to secure uniformity throughout, as otherwise any large horizantal surfaces of castings may be deplated and darkened. Thereafter, the solution is allowed to settle. It is filtered once a week. Double bags are used on each anode to keep sludge out of the solution. Plating is done on an 18- to 20-min. cycle at a current density of about 25 to 45 amp. per sq. ft., which results in a plate of about 0.0007 in. average thinkness. Use of bleeders permits relatively high current density and short plating time.

Upon removal from the nickel tank, castings are rinsed in cold and then in hot water and are transferred as soon as possible to the racks reserved for use in the chromium tank. Next, the castings are given an electrolytic cleaning in a solution containing 10 oz. per gal. of sodium cyanide. A potential of 7 volts is applied in this tank, the castings remaining 5 to 10 sec., after which they are rinsed in cold water and put into the chrome plating tank.

This tank is of steel, lead lined and is provided with a water jacket through which runs a coil in which steam or water can be circulated for heating or cooling to maintain a temperature of 120 to 124 F. In the solution there are normally 55 oz. of chromic acid and 0.55 oz. per gal. of sulphate radical, the ratio of the two being held between 100 to 110 to 1. Current density is 250 to 400 amp. per sq. ft., depending on the shape of casting being plated. Plating time is ½ to 1 minute. This, of course, gives a bright plate, but a small amount of buffing may be required should any "burning" appear.

There are two sets of chrome tanks to keep in step with the nickel tank, one set being operated from a separate generator at night (for economy) when the need arises. Any castings which show defects in the chrome plate are stripped of the latter by electrolytic means in a solution containing 1 oz. per gal. of sodium hydroxide, and are plated again immediately after another cleaning in the cyanide dip. In the hydroxide solution, the work is the anode and the stripping is effected in 30 sec. to one minute.

Upon removal from the chrome tank, the castings receive a drag-out rinse in cold water, the water being used later in making up replenishing solution. Castings then receive a cold-water spray and a rinse in boiling water which causes them to dry rapidly, after which they are ready for inspection and packing.

Inspection is done on special wood benches under frames covered with tracing cloth to disperse the light from the six 200-watt blue-glass incandescent lamps which each frame contains. This excellent non-glaring light aids detection of any flaws.

A separate department enamels castings and bakes this finish. In some plated castings, certain areas are recessed and are subsequently covered with enamel. These areas must be left rough to aid adherence of the enamel, which is improved also by baking at 250 F.

Provisions for finishing die-castings in this plant are unusual insofar as plants devoted to die-casting production only are concerned. Ordinarily, such conditions prevail only where such plants are owned or controlled by manufacturers of products in which die-castings are important adjuncts.

A $50,000,000 Toll

Unnecessary eye accidents occasion losses of $50,000,000 a year in America alone, according to the National Society for the Prevention of Blindness. Neglect in providing goggles, masks or screens, and refusal to use them, are responsible for this huge toll. Insistence on the use of such safeguards reduced eye accidents from 24.6 per 1000 in 1918 to 0.8 per 1000 in 1932. Both the company and the employees deserve great credit. Eye accidents are probably the easiest to prevent and the most serious hazard. Artificial eyes may aid one's beauty but they are useless to see with.

ROUND TABLE

Castings in the Yard

"Al, where's all that work you're supposed to have ahead of the shop? I've never seen the place so empty as it is now."

"We've just stopped cluttering up the shop with a lot of rough castings and other raw materials, Ed. From now on, nothing will be put out on the floor until we want the work done."

"What's the big idea, Al? First thing you know the efficiency of the shop will be in a tailspin."

"Don't you believe it, Ed. With all that stuff out of the way we will be able to see to it that operations are performed when the parts are needed."

"You've a darned short memory, Al. What happened to all of us back in '31? You know as well as I that the boys slowed up in a hurry, when they saw work falling off. You'll have controlled production all right, but the pace will be a lot slower than it is now."

"Not when they know there's plenty of work out in the yard waiting for them. Wait awhile, Ed. This shop is going to be a better

place to work in—now that it has been cleaned up."

"The boys will soon forget about the castings out in the yard, Al. You're a poor psychologist—better keep the work out where they can see it. It's only natural for a man to make his job last as long as possible if he can't see work ahead waiting for him."

Does shop efficiency suffer when operators feel that any job may be their last?

DISCUSSION

Wages Warranted

"The annual wage is nothing new—while never the usual way of paying factory workers, we adopted the practice without thinking it unusual when we started business in 1913," writes A. W. Forbes of Forbes & Myers. "During that period any employee who was laid off could get other work within 24 hr. and there always was the fear that a layoff would mean the loss of the employee. Even as late as 1931, certain companies were keeping their better workmen on the payroll, even without regular work to keep them busy, for fear that someone else would hire them."

"The New Deal has changed all this," continues Mr. Forbes. "It has made it difficult for employers to plan ahead and produce stock for the future. It has added penalties for keeping reserves necessary for spreading employment. Employees have much difficulty in finding other work and even first-class employees can be released with little fear that they will not return readily when needed."

Train In Vain

"Give a young man a chance when he shows promise. Too frequently a capable youngster is held back because his superior has found that he performs his job efficiently," counsels Roger C. Dickey. Writing in a similar vein, W. E. Warner of London, England, points out that when a young man makes good in another department after having been transferred, he reflects credit on the man who trained him. If the men are not advanced when opportunities arise, there is little encouragement for them to do their best.

W. R. Needham, Stafford, England, in writing on this question says that it not only is bad company policy to refuse a young man an opportunity for advancement, but it is somewhat shabby treatment of the man. Had Green been Ed's favorite nephew and Williams had given the advancement to another, Ed undoubtedly would have taken another view of the matter.

Preventive Maintenance

"Every shop man knows that depressions do not last forever—sooner or later the upswing comes and then, as always, the race is to the man who is prepared. It's the fellow who lets maintenance slide who needs to worry about the sheriff," writes Robert S. Alexander. He points out, too, that it is sound shop economics to keep a working force of good mechanics together, even when orders are scarce. Preventive maintenance pays in better plant equipment and better shop morale.

Gift Horse

"Speaking from experience with the problem of gifts to supervisors," writes H. R. Hageman, "they should not be permitted under any circumstances. The matter can be handled easily by means of a tactfully worded bulletin."

Shock Absorber

"While Harry Weston won't stir up so much dust as some of the younger fellows, neither will he make so many useless motions," says L. H. Davy. "He knows when to slight a job and when to use that extreme care that is translated into accuracy." Likewise, J. Homewood points out that no matter how well production is planned, variations are bound to creep in and any means of compensating for irregularities should be a blessing to the person responsible for results. Alfred O. Blumenthal writes that many companies now are using the shock absorber idea by having advanced apprentices fill in where needed.

What Price Heat-Treating

Simple records, easily kept, permit accurate determination of heat-treating costs when a furnace-capacity rate is used

GAYLORD G. THOMPSON
Industrial Engineer, Fairbanks, Morse & Company

SETTING heat-treating costs on a pound basis opens an avenue for glaring inaccuracies and costly losses. Parts of the same over-all dimensions often differ widely in weight and furnace time required, even though both may require the same furnace area. Varying degrees of temperature to which different units must be heated adds to the complications of time estimates.

Direct labor costs require a wide variety of records, often in such volume that complications make the system expensive to operate. One steel-treating concern, when it started in business as a small shop, quoted its prices to customers on the pound basis. The proprietor would look over the parts to be treated and set a price per pound. As the company grew, it became evident that some method of cost finding was needed. Guessing or estimating by several individuals did not produce consistent figures. An industrial engineering organization was consulted and engaged to stall a cost system. After spending several thousand dollars and developing a wide variety of forms, the system was discarded without one day of actual operating efforts. It was seen that more money would be spent to keep up the system than was lost through the inaccuracies of estimating.

Furnace Rates

When a workman is being hired, his experience, health, personality and other qualifications are considered in establishing his monetary value to the company. When he is put to work operating a machine, the work is brought to him in the rough and taken away in a finished or semi-finished condition. His time is charged as direct or productive labor and other workers invariably have their time charged to non-productive or overhead labor. Now, change the animate to the inanimate and consider direct labor applied, for example, to a furnace. By doing this, we again can proceed along the fundamental lines of establishing the monetary worth per hour or minute of the direct labor performed by the furnace. For better differentiation, let us call the direct charge a "direct furnace" expense so as to distinguish between direct human labor and direct equipment labor.

Since we now are considering the furnace in the classification of direct labor, we are confronted with the problem of acquiring cost data. Human labor to operate the furnace is considered as an overhead expense or included in the operating expenses distributed to furnace operating costs and included in the furnace rate per minute-square-inch. This places labor in the position of material movers or handlers, while the furnace completes the operation.

TIME TICKET

Date 10-10-37 Ord.No. 9762
Pieces 300 Part No. 79R
Unit Area 2.5 Rate .00027
Name Pins
Material H. C. Steel
Operation Harden

Date	Time	Pieces	Min. Area	Cost
10-10-37 7 00				
" 8 00	60	50	7,500	2.02
" 9 00				
" 10 00	60	100	15,000	4.04
" 11 00				
" 12 00	60	150	22,500	6.07
Total	180	300	45,000	$12.13

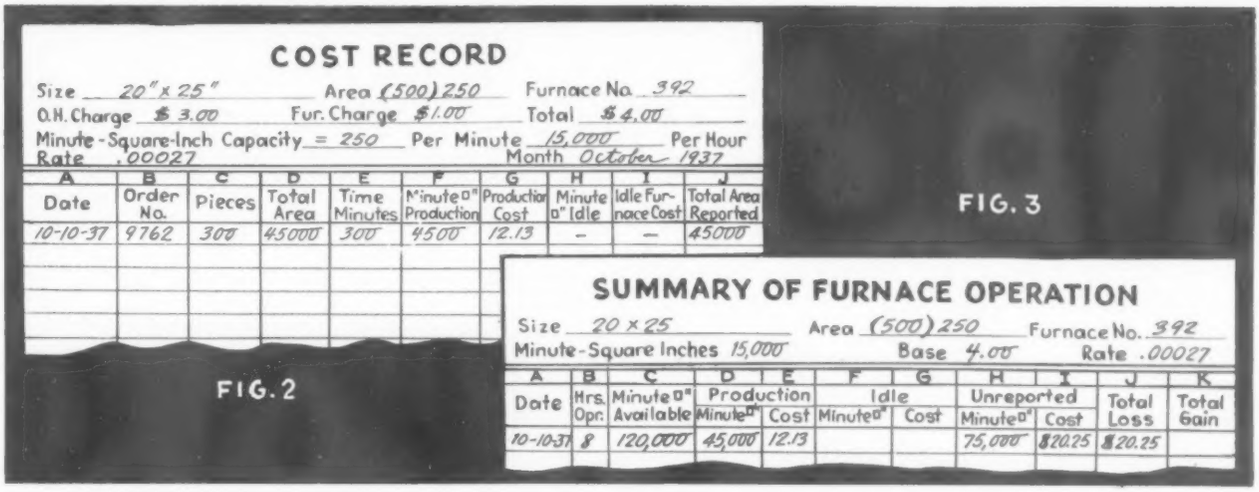
Fig. 1—Original data for furnace cost control is gathered on time cards of this type. Top portion is filled out in the office and the furnace operator records in the lower portion the time each load was placed in the furnace and removed and the number of pieces in each load

One of the first steps is to determine the working surface area of the furnace and, in doing so, it must be understood that it is impossible to use the full area capacity of a furnace at any time. There are necessarily idle areas when parts are placed in the furnace. It has been found in actual practice that a furnace used for heat-treating diversified products has an actual working surface of 50 to 60 per cent of its area. Next, the cost of operating the furnace, including fuel, supplies, air and relining materials must be determined. Labor to operate the furnace should not be included.

Area Charge Rate

Assume that a furnace measuring 20 x 25 in. has an actual furnace charge of $1 per hour and an overhead charge of $3 per hour, making a total of $4 per hour total charge against the furnace. There are 500 sq. in. in the furnace, 50 per cent of which makes an actual working surface of 250 sq. in. This area, if rented for one minute, 60 times, would give a rental area of 15,000 sq. in. per hour, or, as will be referred to from now on, 15,000 minute-square-inches. With a total charge of $4 per hour and a rental area of 15,000 min.-sq.-in., the charge per min.-sq.-in. is approximately 0.00027 cents.

When the furnace is charged with idle time, that is, where no heat is used, the $1 per hour charge is not



COST RECORD

Size 20"x 25" Area (500) 250 Furnace No. 392
O.H. Charge $3.00 Fur. Charge $1.00 Total $4.00
Minute-Square-Inch Capacity = 250 Per Minute 15,000 Per Hour
Rate .00027 Month October 1937

A Date	B Order No.	C Pieces	D Total Area	E Time Minutes	F Minute □" Production	G Production Cost	H Minute □" Idle	I Idle Furnace Cost	J Total Area Reported
10-10-37	9762	300	45000	300	4500	12.13	–	–	45000

FIG. 2

FIG. 3

SUMMARY OF FURNACE OPERATION

Size 20 x 25 Area (500) 250 Furnace No. 392
Minute-Square Inches 15,000 Base 4.00 Rate .00027

A Date	B Hrs. Opr.	C Minute □" Available	D Production Minute □"	E Production Cost	F Idle Minute □"	G Idle Cost	H Unreported Minute □"	I Unreported Cost	J Total Loss	K Total Gain
10-10-37	8	120,000	45,000	12.13			75,000	$20.25	$20.25	

Fig. 2—Computations made on time tickets are extended to this cost record sheet. This sheet measures 8½ x 11 in. and is filed in a loose-leaf book according to furnace number. Work performed by each furnace can be totalled at whatever interval is desired. Fig. 3—Periodical totals from the form shown in Fig. 2 are posted to this summary of furnace operation sheet. Gain and loss columns should balance out

included in the rate when figuring the cost of idle time. However, where there is idle space in the heated furnace, the full rate should be used in compiling idle space cost. At this point, it is well to mention that the elimination of the percentage overhead charge to the furnace is preferable for the sake of simplicity. By this is meant that all operating costs, including all labor, is pro-rated to the various furnaces and included in the cost per min.-sq.-in. All that is necessary then, is to add the percentage of sales expense and profits to the cost as calculated on tickets affecting each job.

Three Forms Needed

In order to report the time element involved in the heat-treatment of widely different parts, it is essential that the necessary forms be provided. In the interest of economy, these forms must be comparatively simple and must not require a large amount of clerical work. The form shown in Fig. 1 is used for gathering the original data required under this system. Top portion of the form is filled out in the office or by a time clerk, the "unit area" being determined from the over-all dimension of the part to be treated. This represents the space that the part will occupy in the furnace. The word "rate" refers to the cost per min.-sq.-in. of the furnace in which the part is to be treated. A time record of the number of pieces treated at each loading of the furnace is kept in the lower portion of the card. Cards similar to Form No. 1 and printed on red stock are used to report idle furnace time.

While there may be some objections to insisting that workers punch in or out on the time cards for every unit or batch placed in or removed from the furnace it should be considered as an essential operation of heat-treating. Objections may be based on the fact that it takes too much time and attention on the part of the workers to punch the clock for every job. However, punching the time card requires very little time and is necessary to give correct costs. In the event that time clocks are not available, the time of starting and stopping each job can be filled in by pencil.

When the cost cards or time tickets are received in the office, extensions are made and the data is transferred to a cost record sheet, Fig. 2. Time tickets then can be filed according to order number for figuring total order cost. Form No. 2 is kept in a loose-leaf book, filed according to furnace number. By doing this, a record is available of the amount of work that each furnace or equipment performs and can be totalled each day, week or month, whichever is preferred. The monthly total is used as a basis of readjustments of min.-sq.-in. rates. Periodical totals of columns *D* to *I* inclusive, are posted to the summary of furnace operation sheet, Fig. 3. The combined total of the min.-sq.-in. columns *D* and *F* on Fig. 3 theoretically should equal the total in column *C*, but seldom does. The heat-treater may not use the full capacity of the furnace on some jobs, consequently the area used will show up in the records as less than the area available. Differences between the area used, or reported, and the area available is posted in columns *H* and *I*, headed "Unreported." The rate used in figuring the cost of idle space, column *I*, should be the full rate because of the fact that the furnace was in operation and idle space was heated. If the furnace was shut down, it would have been reported as idle furnace time on a red time ticket, in which case only the overhead rate is used.

There are times when the heat-treater, by jamming parts into the furnace, will show on the time ticket more space used than is recorded as available. This likewise should be posted as unreported time and the cost entered as gain in column *K*. A too liberal allowance for working surface area will tend to show gains in Column *K*. The ideal condition will be when the gain and loss columns balance out.

Other Applications

While this costing method here is confined only to furnace operation and cost, the fundamental principles of the method can be applied to salt pots, sand blasting, tumbling and similar operations. Quenching tank expenses are included in the overhead or spread over the expenses of the respective furnace or group of furnaces which are served. The cost of carburizing supplies also could be distributed in a like manner. Where parts are placed in pots for heat-treating, it has been found in practice that the rate per min.-sq.-in. remains satisfactory, since the surface area used in the furnace is smaller than the surface area of the parts in the pot, since they are filed in, so as to use the upper air space in the furnace. This method of costing will show the relative operating efficiency of furnaces from day to day. Costs will be more uniform.

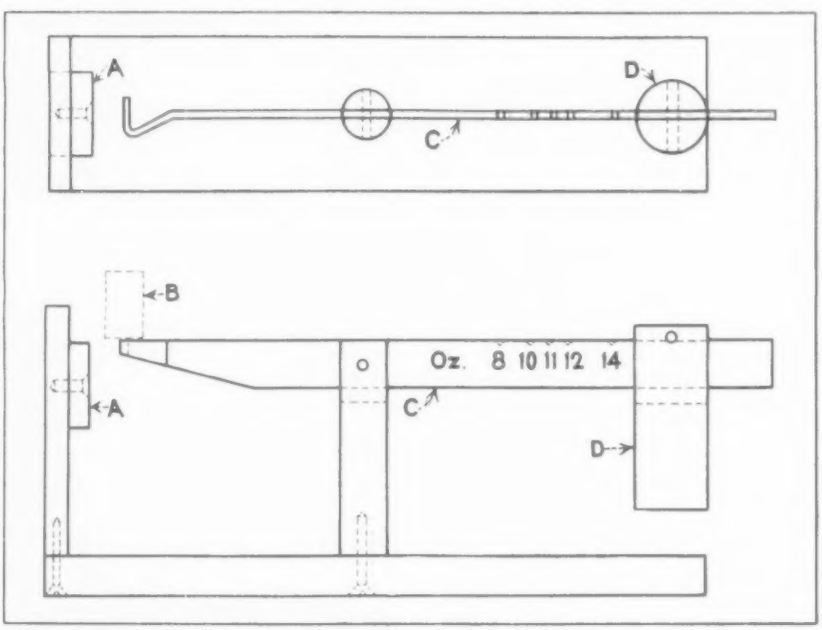
IDEAS FROM PRACTICAL MEN

Tensioning Commutator Brush Springs

W. H. BURLEIGH

During the summer vacation in our schools we sand and refinish several thousand desks, using our portable electric sanders continuously. This heavy duty causes considerable trouble with both brushes and commutators, often causing short and open circuits in the armatures. We have found that when the tension of all the brush springs is set to give the brushes a pressure of 11 oz. on the commutators our troubles are reduced to the minimum. One brush spring having a lower or higher tension than the others in the set can cause the machine to go wrong very quickly.

To get an even tension on the brush springs we developed the fixture illustrated and since its adoption the maintenance troubles on our sanders have been greatly reduced. An assembled brush yoke, complete with brushes and springs is placed on the boss *A* and is rotated to bring one of the brushes *B* into contact with the end of the pivoted beam *C* and is locked in position. The weight *D* is placed in the 11-oz. notch in the beam and the spring is bent with pliers until the pressure of the brush on the beam balances it in a horizontal position, all the brushes in the set being given the same tension. The springs are flat strips wound spirally and are easily bent to required tension.



In this fixture the brush springs of portable electric sanders are bent to give the brushes a uniform pressure of 11 oz. on the commutators

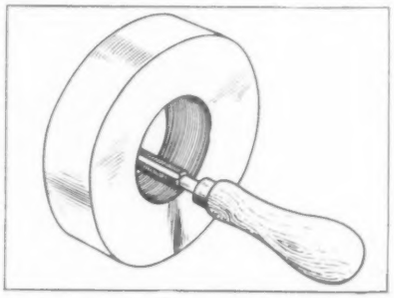
Internal Threads Scraped With a Small Tap

J. E. MOORE
Department of Industrial Education, Wichita High School East

Last summer a machinist was sent from the St. Louis factory of a printing press company to replace certain worn parts of a printing press in our school shop.

One of the new parts was a large collar having internal threads of 16 per in., but the threaded hole was a wee bit too small to permit the collar to be screwed onto the shaft where it was to go. Since we had no tap with which to retap the threads, the collar was chucked in the lathe and the threads were scraped out with a $\frac{3}{8}$ in. 16 tap held in a file handle, as shown.

As the current was turned off in our machine shop, the lathe was operated by pulling the belt by hand. However, we got the job done soon.



A small tap held in a file handle was used to scrape out the internal threads in a collar to permit it to be screwed on a shaft

Improved "Swamp Sticks"

ELTON STERRET

Pieces of pipe used as extensions to wrench handles (called swamp sticks in the Texas oil fields) fail to stand up satisfactorily under hard service. Usual failures are either splitting or distortion to a pear-shaped cross-section of the end slipped over the wrench handle, either of which make the pipe likely to slip off the wrench. Both failures may leave sharp edges that can inflict serious cuts on the hands of the user if the pipe is reversed.

One shop noted the weakness of the ordinary scrap-pile swamp stick and with a welding torch worked over several short lengths of pipe into what became parts of the regular shop equipment. The improvement consisted in depositing the welding metal to form heavy beads at both ends of the selected pipe lengths. The bead on the end slipped over the wrench handle served to reinforce the pipe at that point. The bead at the outer end served as a guard for the hands of the user, the ridge so formed preventing even greasy hands from slipping off the end of the pipe and possibly causing injury to the workman.

One unexpected result noted was

that pieces of pipe so reinforced were not seized upon whenever they were wanted for piping needs just at the time they were most in demand for wrench extensions.

Three-Station Progressive Press Tools

W. Z. FIDLER
Reynolds Engineering Company

In the press tools illustrated, strip stock sheared to the correct width to obtain the developed size of the cylindrical spacer shown in the upper right-hand corner is progressively lanced and first formed. It is then advanced to the second station where further lancing is done and the part is formed into a U-shape and then advanced to the third station where it is cut off from the strip and sized to the finished shape and dimensions.

The lancing done at the first station is for a short distance only from the edges of the strip and the forming consists of bending the edges at a radius equal to that of the finished piece. It takes in approximately 60 deg. of the curvature from each edge, as shown in section *C-C*. At the second station, shown in section *B-B*, the mandrel for forming the U-shape is undercut to clear the formed edges of the piece. Only a small neck holds the piece to the strip after this operation. The top of the mandrel block shown in section *B-B* and the top of the forming block shown in section *C-C* are flush with the die-block shown in section *D-D*.

Interlocking fingers are provided on the upper and lower forming blocks of the third station, as shown in section *A-A*, so that the U-shaped piece will be completely guided during the sizing operation. At this station the bottom of the groove in the lower block should approximately line up with the curved edges of the U-shaped piece at the second station. Then as the U-shaped piece is advanced to the third station, its curved edges will push the finished cylinder ahead and eject it properly from the die.

One gate stop only is required. It is the block shown at the front of the second station. The block is undercut as shown in section *B-B* so that after the edges of the stock have been lanced and formed, the forward edge will pass below the undercut and the straight portion of the stock will gage against the lip of the gage-block.

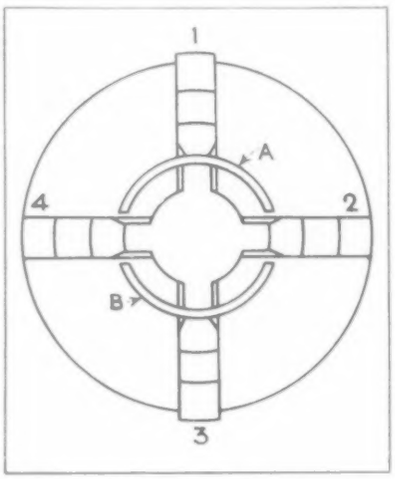
Truing Chuck Jaws

A. J. KARLSON
Karlson Machine Works

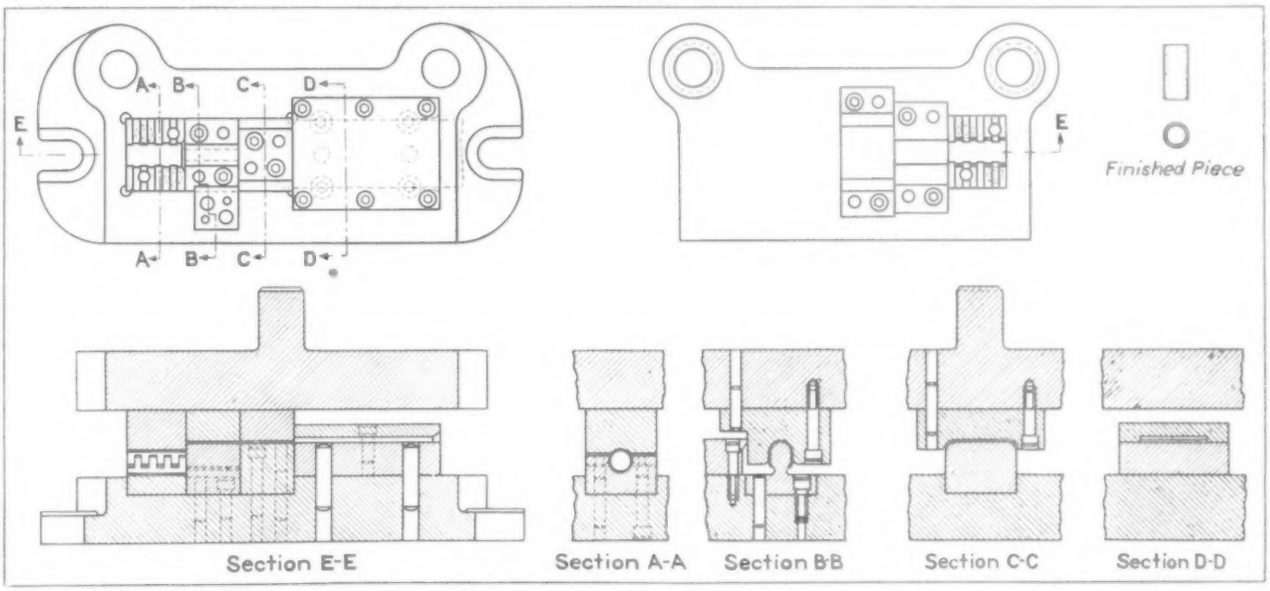
In an article under the above title (*AM*—Vol. 82, page 186), J. Homewood suggests a method for holding chuck jaws while they are being trued by grinding. In the meantime until chuck manufacturers see fit to cooperate with him, I will continue to follow the method outlined below.

For a three-jaw universal chuck I set the jaws to fit snugly on a short piece of round steel. Then I solder a spot on the side of each jaw to the body, first brightening the spots with abrasive cloth and rubbing them with raw muriatic acid on a clean cloth. The piece of steel is then driven out and the jaws are ground with a small toolpost grinder. After the jaws have been ground the solder is cut away with a sharp knife.

In truing the gripping surfaces of the jaws of an independent four-jaw chuck, two opposite jaws are ground at a time, being held by the two pieces of flat steel *A* and *B* which are bent as shown and are held by the other two jaws. The ends of the steel pieces are held in contact with the angular parts of the jaws to be ground. For example, if jaws 2 and 4 are to be ground, the steel pieces are held by jaws 1 and 3. Tightening jaws 2 and 4 outward and hold them



In truing the jaws of independent four-jaw chucks, two jaws are ground at a time, being held by two pieces of steel bent as shown



A cylindrical spacer is produced in three operations in these press tools. Advancing stock ejects the finished piece from the die at the last station

while they are being ground. Jaws 1 and 3 are then held by the steel pieces being gripped by jaws 2 and 4 and grinding them completes the job.

Crane for Handling Large Lathe Chucks

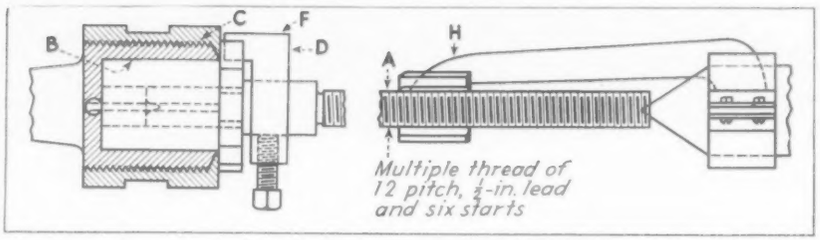
JAMES WALKER

Large lathe chucks require two men to put them on and remove them from the spindle. Even then there is danger that the chuck will be dropped as it comes off the spindle and injure the ways of the lathe.

The illustration shows a small jib crane by which one man can safely handle a large chuck. The bracket *A* is attached to the back of the lathe bed and is bored to receive two bronze bushings in which the lower end of the jib fits. Two collars permit the jib to be adjusted for height and to retain it in place in the bracket.

In removing the chuck from the spindle, the crane is swung over the chuck and the threaded rod *B*, attached to the handwheel *C*, is put through a hole in the jib into a hole drilled in the periphery of the chuck. The nut is then screwed onto the rod through an opening in the back of the chuck. Holding the nut and turning the handwheel brings the nut snugly against the top of the opening. The spindle is then revolved backward to unscrew the chuck. As it comes off the spindle its weight is taken by the crane, which is then swung so that the chuck is at the back of the lathe. There it hangs from the crane until it is wanted again.

If the lathe has a taper attachment with which the crane will interfere, a piece of 4 x 4-in. channel iron can be attached to the back of the taper attachment, as at *D*, and the crane bracket can be attached to it.



The screw is indexed for the multiple threads by a lug on the driving dog alternately engaging slots in the flange of the bushing

Bushing for Indexing Multiple Threads

ARTHUR SILVESTER

The screw shown at *A* is a detail for the sight of an English 4-in. gun, the material being phosphor-bronze. The multiple thread to be cut is ½-in. lead, 12 pitch, and has six starts.

Phosphor-bronze bushing *B* is turned to fit the spring chuck *C* and is bored for a push fit for the short end of the work. The flange of the bushing has six equally-spaced slots. Driving dog *D* is bored for a slip fit on the short end of the work and has a lug at *F* which is a push fit in the slots in the bushing flange.

In operation, the bushing is held in the spring chuck, the dog is clamped on the work with the lug engaging one of the slots in the bushing, the opposite end of the work being supported by the tailstock center. The work is prevented from springing away from the cut by backrest *H* which is attached to the tailstock center. After the first one of the multiple threads has been cut, the tailstock center is backed off and the work is slid endwise far enough to withdraw the lug on the driving dog from the slot in which it is engaged in the bushing flange. The work is then rotated so that the lug on the dog will engage the next slot in the bushing flange, the tailstock center is brought up and pushes the short end of the work up to its shoulder in the bushing, and the second thread is cut. This process is repeated until all threads are cut.

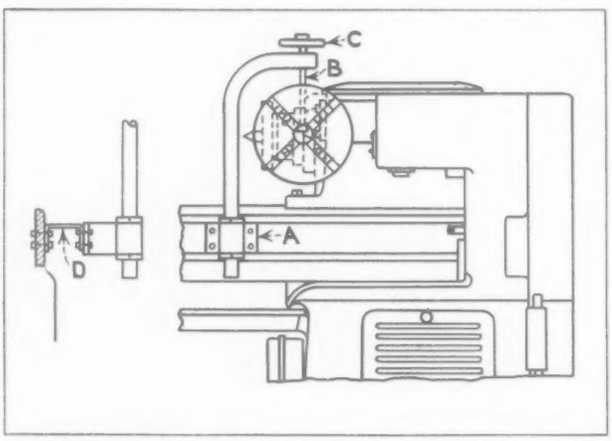
Removing Chucks From Lathe Spindles

SAMUEL REDDICK

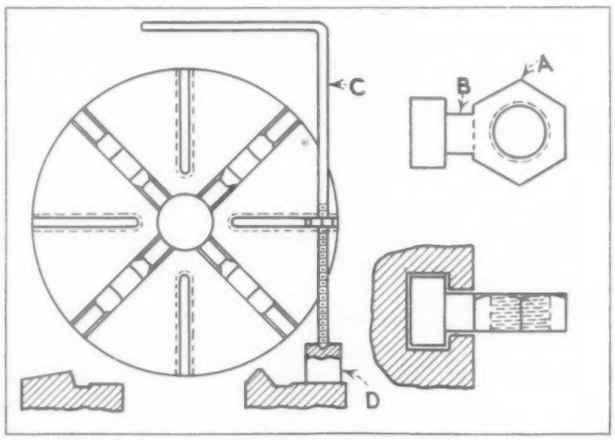
Chucks that have T-slots in their faces and are tightly screwed to lathe spindles can be loosened by the device illustrated.

The device consists of the nut *A* welded to the stub end of the bolt *B*; the threaded rod *C*, the upper end of which is bent to form a lever; and the block *D* on the lathe bed.

In use, the bolt head is placed in one of the T-slots in the chuck face and the back gears are locked in mesh. Rod *C* is then screwed through the nut until its lower end engages a dimple in block *D*. It is obvious that further turning of rod *C* in the same direction will draw the combined bolt and nut upward and start to unscrew the chuck from the spindle. The chuck can then be unscrewed and removed from the spindle in the usual way.



By means of this small jib crane, one man can put on and take off a large lathe chuck from the spindle with safety



Chucks that are tightly screwed to lathe spindles can be loosened by this device so that they can be removed in the usual way

AMERICAN MACHINIST *Reference Book Sheet*

Causes and Correction of Gear Noises

The gear industry has more or less adopted a nomenclature for gear sounds:

Edge squeal, general squeal and whines are closely related, but can be differentiated with respect to speeds and loads. Edge squeals will generally disappear under load, while general squeals will continue throughout the load period if the speed is sufficient. A whine represents a squeal of considerably higher pitch and is objectionable to the ear.

Knocks and growls are closely related: knocks are usually limited to one or two teeth contacting while the growl is recognized as a knock on practically all of the teeth.

The eccentricity sound is described by its name. A rattle can be produced by a loose part, or by a natural interference connected up with some eccentricity, or by a variable helix angle at high speed. Bearing sounds can be segregated by removing related gears and testing bearings on the shafts alone. Each of these sounds can be caused by a series of items which complicate a diagnosis of the trouble and its correction by some of the following means:

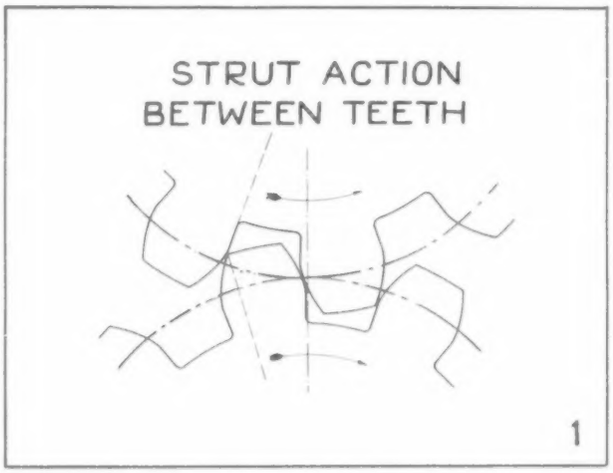
Abstracted from a paper on "Sound Testing" presented by R. S. Drummond, president, National Broach & Machine Co., before the American Gear Manufacturer's Association, April, 1938.

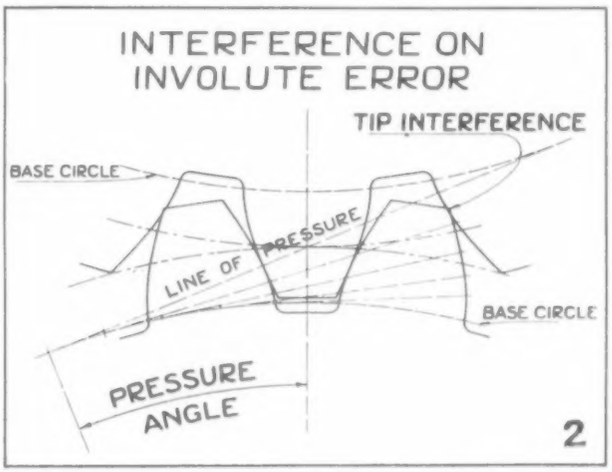
Strut Action

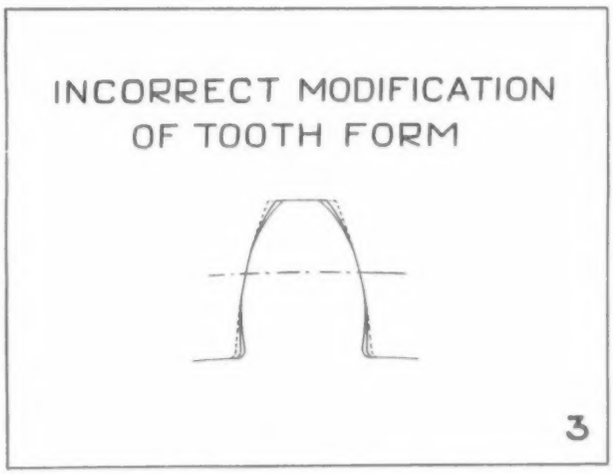
One of the most important causes of gear noises is the contact of the teeth on approach. When teeth come together, as shown in Fig. 1, the tips of the teeth operate as a pair of struts to interrupt the motion rather than to continue it. Gear noise occurs from shaping tools having uniform profile on opposite sides of the teeth, which may produce two different pressure angles on the product. In some plants cutting tools are made with different pressure angles on the two sides to produce uniform profiles on the product.

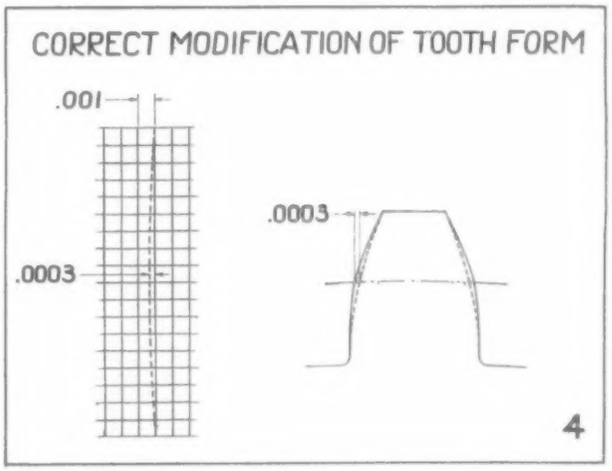
Tip Interference

Contact of the tips of the teeth against protuberances on the mating gear near the base circle, Fig. 2, gives one of the worst gear sounds. This condition is avoided in some









AMERICAN MACHINIST *Reference Book Sheet*

Causes and Correction of Gear Noises

instances by cutting off the addendum of the mating part.

Profile Modification

Some designers modify the tips considerably because accuracy of manufacture is not sufficient to permit the tooth surfaces to come into proper contact. An example of excessive modification was that of 5-pitch gear in which the teeth were given a negative curve of 0.003 in. from the tip to the operating pitch line and then again below the pitch circle, thus producing contact only near the operating pitch circle, Fig. 3. Modification is shown in Fig 4.

To avoid noise arising from bad approach contact, the tops of the teeth have sometimes been deliberately cut away on the driven sides, Fig. 6, so that contact is made near the operating pitch line. This extreme design of tooth is used with a very high helix angle and small pressure angle because the face width of the gears is 1 in.

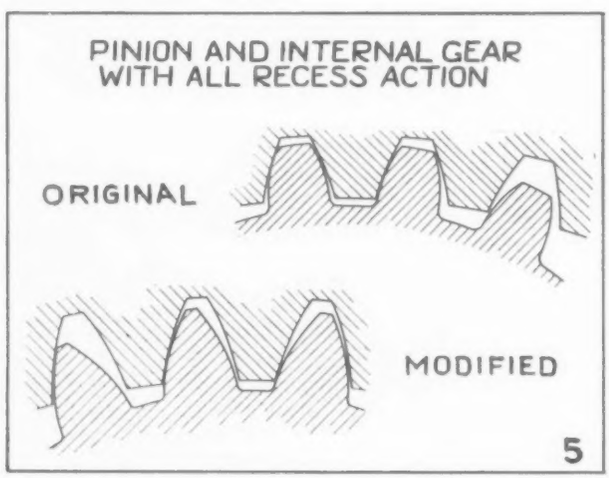
All recess action in the case of a pinion and internal gear, Fig. 5, was obtained by the following modification: In the first design for a one-direction drive the gears were 6/8 pitch and had normally designed teeth. The change consisted of using a 6 pitch in which a 21-tooth pinion was cut on a 22-tooth blank.

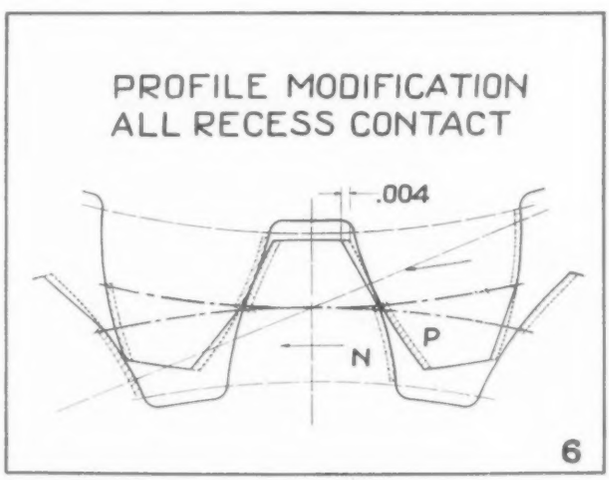
Heat-Treatment Distortion

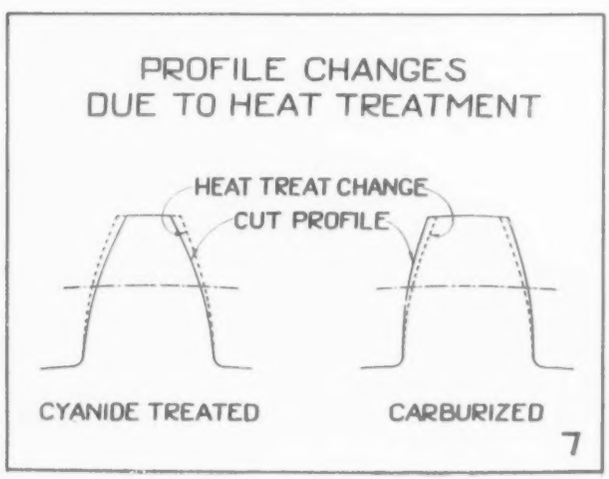
A frequent cause of noise in hardened gears is the distortion caused by the hardening process. In cyanided gears it is usual to find a 0.001 in. rise in the involute curve, Fig. 7. The rise is even greater in gears with smaller numbers of teeth, such as 7 pitch, 12-tooth. Carburizing has a tendency to shrink profiles by about 0.001 in. These distortions are so well established that it has become good practice to make the tools in error to compensate for normal heat-treat change.

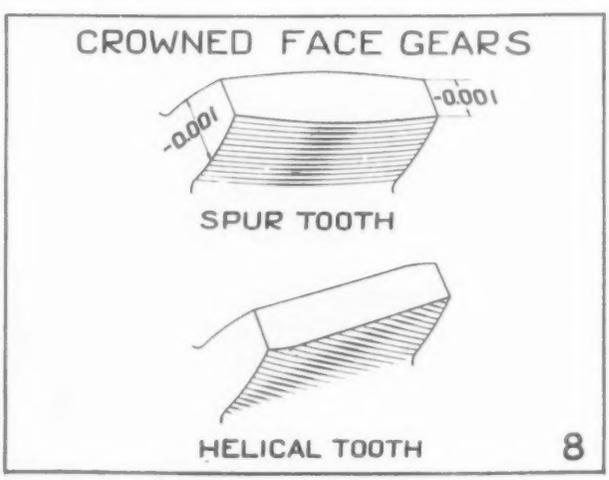
Crowning

Barrelling or crowning has proved of value in heat-treated gears. Many gears can be used after heat-treatment as the crowned or barrelled surfaces avoid slight errors of form. This barrelling or crowning is used to the extent of 0.001 in. between the mating parts with a face width of 2 in.









NEWS OF THE INDUSTRY

Metal Trades Speakers Discuss Management Problems at Convention

Job evaluation and employer-employee relations were the principal topics considerd during two-day program

NEW YORK—N. W. Pickering, president of Farrel-Birmingham Co., was elected president of the National Metal Trades Association at its fortieth annual convention, held May 25–26 at the Hotel Biltmore. A. H. Timmerman, vice-president of the Wagner Electric Corp., was named first vice-president, and Roe S. Clark, vice-president of the Package Machinery Corp., becomes second vice-president and treasurer of the Association.

Charles H. Strawbridge of the Goodman Mfg. Co., and retiring president of the Association, stressed the increasing demands being made on those who seek to develop and maintain their businesses under satisfactory relations with their employees. He was convinced that "until the country is willing to recognize the basic soundness of the principle of increasing production as a foundation for improving our standard of living, by making such products available through lower prices, and discard the theory of restricting production and increasing prices, there can be no permanent ground for recovery in this country."

Advantages of a progressive outlook on the part of both management and employees and the results obtained by the Evansville Co-Operative League in a campaign for industrial peace were discussed by T. J. Morton, Jr., president of the Hoosier Lamp & Stamping Corp. Mr. Morton said that public opinion is but the sum total of individual opinions; industrial problems can be solved only by individual contacts within a community.

The League operates to give all the citizens of Evansville facts concerning the city's industries and encourages the general discussion of business as well as industrial questions.

Industrial relations and job evaluation were the subjects of reports by N.M.T.A. committees. O. D. Reich, vice-president of the Dexter Folder Co., and chairman of the committee on job evaluation, pointed out that proper job evaluation is the basis of good labor relations.

Recommends Weight Factors

The committee favored the use of weight factors in connection with the elements considered in evaluating a job. Allen W. Rucker, president of Eddy-Rucker Nickels Co., brought out that labor always has received a fairly constant portion of the value of production and showed by graphs the constancy of the relation between total payrolls and total output values over a considerable time, in discussing a means for restoring control to management.

J. B. Doan, American Tool Works Company, and P. O. Geier, Cincinnati Milling Machine Company, found much of interest in the meetings. N. W. Pickering, Farrel-Birmingham, is the new N. M. T. A. president

A. H. Timmerman, Wagner Electric Corp.; J. G. Benedict, vice-president, Landis Machine Co.; Paul DeWolf, vice-president, Brown & Sharpe Manufacturing Co.; Harold S. Falk, vice-president, The Falk Corp.; Henry W. Johnson, vice-president, De Laval Steam Turbine Co., and chairman, N.M.T.A. Industrial Relations Committee

Steel Executives Look for Improvement In Mill Operations Before End of Year

Institute members told that future adaptations of light weight steels will far exceed anything yet experienced

NEW YORK—That better times may be expected before the end of 1938 was the consensus of opinion of leading steel executives who attended the forty-seventh general meeting of the American Iron and Steel Institute on May 26. There was a notable absence of carping criticism and in its place a serious determination to cooperate wholeheartedly in any sound national program to revive industry.

General Hugh Johnson, speaking at the annual dinner, urged the industry to throw its influence behind a program of reasonable regulation by government, warning that the only alternate is for government to manage industry completely. Public opinion, he reasoned, will never permit a return to a *laissez faire* policy.

A pleasant climax to the program was a brief address by Charles M. Schwab, dean of the industry, who deplored the lack of ambition and aggressive "will to do things" which he sees in the younger men in industry today. Institute members saluted Mr. Schwab with a resounding ovation.

Although the immediate outlook is obscure, there appears to be no basic economic reason why this depression should be of prolonged duration, said Tom M. Girdler, chairman of Republic Steel, in his presidential address. He praised Congress for revising the tax law. He urged development of a sound national fiscal policy, adoption of a predictable government attitude toward industry, such government regulation of industry as is in the public interest but which does not compete with industry or put it in a strait-jacket, and amendment of the Wagner Act.

Future adaptions of higher quality, lighter weight steels will far exceed anything yet experienced, predicted W. A. Irvin, vice chairman of United States Steel Corp. In connection with development of continuous sheet mills, he anticipates the gradual appearance of many cold-formed sections which will extend the scope of flat-rolled products, this movement being aided by advances in the art of welding. He pointed out that the varieties of steel have multiplied with new alloying and rolling techniques so that today the automobile industry has available and uses about 125 different kinds of steel in its cars.

E. T. Weir, chairman of National Steel Corp., emphasized in his address that steel must tell its story to the public and must bring its public relations activities up to the standard of its enterprise in all other respects.

Steel producers should encourage the placing of small orders with warehouses, said N. J. Clarke, vice-president of Republic Steel, at the commercial session which drew an attendance of 350. He declared that the "small order" problem has been intensified by the fact that today there are thousands of different compositions and types of steel which make it difficult for the producer to carry an inventory broad enough to fill small orders without actually making the steel.

W. B. Gillies, vice-president of Youngstown Sheet & Tube, said that because of improved steel quality, customers have been able to eliminate many steps in their manufacturinging processes and thus reduce production costs, enabling them to sell at lower prices.

One happy circumstance of the close bond between sales and research has been a choice of notably improved and eonomical steel products, remarked R. E. Zimmerman, vice-president of United States Steel Corp. of Delaware, in a paper on "Coupling Sales To Research." "Iron Quality as a Problem of the Steel Industry" by H. W. Graham, general metallurgist, and H. K. Work, director of research of Jones & Laughlin Steel Corp., was among the papers at the technical session.

Charles M. White, vice-president in charge of manufacture of Republic Steel, received the Institute's medal for the best paper read at the 1937 meeting. Officers headed by President Girdler, were reelected.

Harris & Ewing

TOM M. GIRDLER

W. B. GILLIES

NORRIS J. CLARKE

R. E. ZIMMERMAN

H. W. GRAHAM

H. K. WORK

W. J. Cameron Tells Machine Tool Dealers Engineers Should Run the Country

Association's first sales clinic yields a wealth of information on how to improve selling technique

DETROIT—Two hundred members and guests of the Associated Machine Tool Dealers of America (a record turnout) made the banquet at the Dearborn Inn, Dearborn, Mich., the high spot of their two-day meeting, May 23 and 24. W. J. Cameron, Ford Motor Co., was the speaker of the evening and his talk traced the development of tools and the corresponding evolution of human intelligence.

Mr. Cameron pointed out that today our engineering management is definitely more efficient than our financial management. It is a product of current conditions rather than a survival of prehistoric ideals and ideas represented by political and financial management. No engineering mind could possibly have conceived such inequitable and unbalanced legislation as the Wagner Labor Relations Act or the undistributed earnings and capital gains taxes.

David A. Wallace, president of the Chrysler Div., Chrysler Corp., spoke on "What the Machine Tool Buyer Wants to Know from the Machine Tool Seller." Going on to discuss shortcomings of machine tools, he said that chip disposal has not been solved. High-grade hydraulic equipment, while it has greatly reduced the down time of machine tools, still gives too much trouble. Machine tools should be built with more accessibility, and safety must be further stressed.

President A. G. Grant set the keynote for the convention when he said, "Our major interests at this time are first: how may the general level of machine tool activity be stabilized? and second: how can we do a better job of selling the products of our manufacturers?

"We must find ways and means of improving our selling technique, of becoming more and more efficient in our organized sales engineering so that in improving our own status as dealers, we shall at the same time be strengthening and stabilizing our industry. Through this reasoning there has developed the need for an interchange of ideas and of experiences which we have designated a sales clinic. It is our hope that from this modest beginning our future conventions will develop the idea of sales clinic with more comprehensive proportions."

Jack C. Carlton, Calco Machinery Co., Philadelphia, observed that this is the time to do missionary work because customers will talk and listen and let the salesmen go over the equipment in their plant. Mr. Carlton pointed out that the dealers can learn a lot from the factory man and that the smart salesman uses the factory man to get him into plants that he can't get into alone.

Henry G. Weaver, director, Customers' Research Division, General Motors Corp., remarked that a good rule to follow in selling is to find out what people want and do more of it and find out what they don't want and do less of it. Why should we approach raw materials objectively and dispassionately, learn how to handle them and bend them to our needs while we approach the human being on an entirely emotional ground and fail to sell him?

D. A. WALLACE

Howard W. Dunbar, vice-president, Norton Co., and president, National Machine Tool Builders' Association, said, "It is my belief that the price ceiling of our industry has been reached and we must direct our attention to the lowering of costs in our products in order that we may realize or improve our present profit levels, and thus obtain the high standard of living and high wage scale our industry stands for."

LATE *NEWS* WIRES

WASHINGTON—Senator Thomas, chairman Senate labor committee, will join Senators Pepper and Ellender in conference fight for wage-hour differentials determinable by Labor Standards Board. Roosevelt reported behind them. Neatest pacifist bill in coon's age, approved by Senate military affairs committee, compels everybody with $1,000 or more to loan government money at low interest rate to finance war. Army and navy will fight it.

NEW YORK—Soviet Russia reported to have placed large machinery orders in this country. Business said to have been taken on basis of open orders with payment 45 days after shipment. Informed quarters say this method of doing business is mainly for uniformity of bookkeeping practices, since Russians don't need credit.

DETROIT—Ford's new tire plant at Rouge now building 4000 tires a day operating on two, eight-hour shifts. By Fall, after more equipment is installed, capacity will be raised to 6000 tires in eight hours. Most of machinery in plant is of Ford design.

CHICAGO—Four thousand men will start work this week at Seaman Body and at Nash at Racine and Kenosha following strike settlement late Friday.

WASHINGTON—If wage-hour legislation doesn't become law, administration plans amendment to Walsh-Healy Act making all public contracts of $2,000 or more subject to that act's provisions.

TOLEDO—Libby-Owens-Ford Gass Co. has recalled 400 men to work beginning tomorrow. Shortage of glass stocks which has developed in recent weeks requires replenishing.

CHICAGO—Ware Brothers, Chicago Roller Skate Co. and Logan Engineering Co. are planning new factories or plant additions.

DETROIT LETTER

Quietest automotive summer in prospect . . . Upturn not expected before Oct. 1 . . . A larger share of tooling is being handled in car plants . . . Labor is quiet as Martin attempts to put U. A. W.'s house in order . . . 1940 models to be shown in January to suit dealers

DETROIT—For the first time since automobiles were turned out by the dozens instead of thousands, the industry's second quarter will show a lower production total than for the first three months of the year. May has already nose-dived to 190,000 or thereabouts, and June will do exceptionally well to total up to 150,000. Better than 200,000 would be needed in June to equal the first three months—and that seems out of the question now.

The industry is sloughing off rapidly into what promises to be the quietest automotive summer in history. Car stocks are still well up in the field and there are still any number of new 1937 models in storage. The first signs of clean-ups—the frequency of advertisements of "demonstrator" and "executives'" cars—have already made their appearance. Nobody seems to be planning much in the way of price cuts as yet, although increased dealer trading allowances are reported to be on the way.

No New Model Rush

This summer the industry will need all the time it can get to clean its floors and as a result none of the companies seems to be particularly anxious to rush in with new models. Right now it looks as if major parts production for 1939 cars would not get under way until Sept. 1 or 15. And as parts production runs some 15 to 30 days ahead of final assembly, that would mean about Oct. 1 before production would pick up to any considerable extent.

That serves to explain to a large extent the slowness of the industry in getting tooling under way even on the relatively minor changes yet contemplated. Tool and die shops are still picking up business and employment in the Detroit area, where normally they should have reached their peak by June. But their business is not as good as it might be for another reason. With companies not worried about production during the summer months, tool and die men in the car factories can be taken off maintenance work and put on new model development to a greater extent than in recent years. Many companies are following this practice.

Labor Held Up Die Work

Another reason why tool and die shops in Detroit haven't received some of the more juicy orders—some of these have gone out of town—is that the industry had its fingers crossed on the labor situation. With the U.A.W. having corralled dozens of the major tool and die shops, a showdown between the remaining M.E.S.A. strength and the U.A.W. was possible. Furthermore, the U.A.W. contract with the Tool & Die Manufacturers' Association had expired, and the union and the association were deadlocked for weeks on the question of renewal.

Signing of a new contract has cleared the air in that direction. The association won its point on maintenance of fairly long hours during peak seasons. The union won out in avoiding a base wage reduction, while the share-the-work provision was set at 32 hours weekly before layoffs instead of the 24 demanded by the union. An important point in the new contract is that it extends to Jan. 1, 1940, or until after the usual seasonal rush of business is over.

Incidentally next year's tool and die season will probably come considerably later than this year, as pressure on car factories to put the Automobile Show date back to January instead of in the fall promises to bear fruit next year. It is understood that there is a tentative agreement between factories and dealers to do this for 1940 models, as a compromise resulting from dealer objections to a fall show this year.

On the G.M. labor situation, the strike voted by Flint workers is being held in abeyance and it would be surprising if anything materialized with production at so low a point.

Martin doesn't want strikes right now, as his major problem is internal reorganization of the U.A.W. First move in this direction, a week or so ago, was the announcement as "unanimously approved by the International Board" of a 20-point program, which covered such factors as:

1. Recognition by all members (and locals) of the authority of the executive board.
2. Elimination of wildcat strikes and "maximum responsibility in carrying out contracts with employers".
3. Reduction in hours of work and support of wage-hour bill.
4. Organized resistance to wage reductions.
5. Drive to organize plants competitive with those organized already within the industry, to protect the latter against loss of business and decreased employment by reason of differential wage scales.
6. Intensification of campaign to organize WPA workers.
7. Participation in activities of Labor's Non-Partisan League's political activities.

Martin apparently has swung around to the belief that U.A.W. management should be largely on the basis of committees with individualized responsibilities kept down to the minimum. Thus, the Ford organization drive, when renewed, will most likely be placed under the jurisdiction of a Detroit five-man regional board, rather than one man. The central board will then coordinate efforts here with those in other localities such as Kansas City, St. Louis and the West Coast.

Other developments of interest in the automotive industry recently include Ford's announcement of a line of cab-over-engine truck models, following the practice set by producers of heavier duty trucks in this respect. The move will enable an increase in load carrying capacity of Ford trucks under various state laws by shifting more of the load to the front wheels and reducing the rear wheel load.

Machine tool business in the Detroit area continues to hold up remarkably well, everything considered, in spite of stoppages on orders from Ford.

For those who like to play around with unconfirmed rumors, the two most widely discussed in Detroit include the moving of Nash body production to Detroit, and Bohn production from Detroit to Fort Wayne, Indiana.

A.S.M.E. Semi-Annual Meeting in St. Louis

Fifteen technical sessions are planned for the semi-annual meeting of the American Society of Mechanical Engineers at the Hotel Statler in St. Louis from June 20-23. The A.S.M.E. and the Army Ordnance Association will also hold a joint National Defense meeting on Tuesday evening, June 21. Maj. John K. Christmas, chief of the Automotive Section, Artillery Division, Manufacturing Service, will talk on "The Manufacture of High Speed Tanks."

A condensed program follows:

Monday, June 20

8:00 p.m.

"Practical Applications of Motion-Study Research," by Ralph M. Barnes.

Tuesday, June 21

9:30 a.m.

"Locomotive Axle Testing," by T. V. Buck-Walter, O. J. Horger, and W. C. Sanders.

2:00 p.m.

"Engineering Phases of Thermoplastics," by J. M. DeBell.

Wednesday, June 22

9:30 a.m.

"An Apprenticeship Training Program," by H. L. Humke.

"Oxyacetylene Surface Hardening," by A. K. Seemann.

"Welding Applied to Plant Maintenance and Repairs," by H. R. Wass.

"Arc Welding Costs," by E. W. P. Smith.

Thursday, June 23

9:30 a.m.

"Report on Standardization of Roughness Measurements," by J. R. Weaver.

"Scope and Limitation of the Projection Method for Shop Measurement," by Henry F. Kurtz.

"Surface-Finish Measurements," by E. J. Abbott.

Electro-Platers to Meet in Milwaukee, June 13-16

Twenty-four technical papers are scheduled for presentation at the 26th annual convention of the American Electro-Platers' Society, to be held at the Hotel Schroeder, Milwaukee, from June 13-16. All papers will be read at the five educational sessions to take place the first three days of the meeting, while business sessions and the annual banquet and dance will be reserved for the last day. The program follows:

Monday, June 13

1:30 p.m.

"Summary of Research on Electrodeposition at the National Bureau of Standards," by Dr. Wm. Blum, U. S. Bureau of Standards.

"Preparation of Specimens for Exposure Tests," by P. W. C. Strausser, research associate of the A. E. S.

"Primary Current Distribution in Electrodeposition in Liniar, Cylindrical, and Spherical Conductors," by C. Kasper, Bureau of Standards.

"Survey of Metal Cleaning," by the Dayton branch.

"Advancements in Electroplating in a Lifetime," by Bert Sage, A. S. Campbell Co.

"Practical Demonstration of What Happens in a Plating Barrel," by Dr. Burton G. Daw, Lasalco, Inc.

Tuesday, June 14

8:30 a.m.

"Physical Properties and Uses of Heavy Nickel Deposits," by W. A. Wesley, International Nickel Co.

"Bright Nickel," by G. Soderberg, technical director, The Udylite Co.

"Importance of Correct Anode Corrosion in Nickel Plating," W. Pinner and E. Borchardt, General Spring & Bumper Co.

"Investigations in Bright Zinc," by Dr. C. B. F. Young, Columbia University.

8:30 p.m.

"Answers to 101 Questions on Copper Plating," by the Springfield branch.

"The Effects of Metallic Impurities on the Structure of Cyanide Copper Deposits," by Dr. Walter R. Meyer, electro-chemist, General Electric Co., Bridgeport.

"High Speed-High Temperature Copper Plating Solutions," by Floyd Oplinger, E. I. duPont de Nemours.

"Cyanide Copper Bath—Rochelle Salt," by Robert Wagner, Guide Lamp Div., General Motors Corp.

Wednesday, June 15

1:30 p.m.

"Dips and Their Uses in the Plating Cycle," by Hartford branch.

"Metal Coloring," by George Hogaboom, Hanson-Van Winkle-Munning Co.

"Effect of Carbonate and Sulphate on Cyanide Plating Solutions," by R. O. Hull, Grasselli Chemical Co.

"Electroplating Solves Manufacturing Problems," J. H. Hoefer, A. T. Wagner Co.

8:30 p.m.

"Wetting Agents in Plating Solutions," by the Newark branch.

"Industrial Finish Manufacture," by E. Bucy, Zapon-Brevolite Div., Atlas Powder Co.

"Use of Solvent Emulsions in Cleaning," by Dr. Mitchell, technical director, Magnus Chemical Co.

"Fume Exhaust Design," by Toronto branch.

"Practical Solution Maintenance," by Philadelphia branch.

"Matt and Bright Dipping," by Waterbury branch.

U. S. Army Is Not Yet Ready for War

ROCK ISLAND, ILL.—"Fifty per cent of our Army's defense program is finished," declared Assistant Secretary of War Louis A. Johnson before 600 members and guests of the Army Ordnance Association, which held its nineteenth annual meeting here during observance of the 75th anniversary of the Rock Island Arsenal on May 25. Col. Johnson paid tribute to the retiring Chief of Ordnance, Maj. Gen. William H. Tschappat, and lauded the qualities of the new incumbent, Maj. Gen. Charles M. Wesson, who takes office June 2.

Brig. Gen. Benedict Crowell, who presided at the dinner, announced that Gen. Tschappat had been made the first and only honorary life member of the Army Ordnance Association as a tribute to his attainments.

Members of the Army Ordnance Association witnessed a simulated attack on a gun emplacement by tanks, combat cars and armored scout cars, and other demonstrations under the direction of Col. N. F. Ramsey, commandant of the arsenal. Rock Island Arsenal is the only government manufacturing plant where combat vehicles are produced. Secretary Johnson said that if even this huge arsenal and the other five manufacturing arsenals were fully modernized and manned, they would be able to produce only 10 per cent of the nation's requirements in war. That is why he favors passage of the educational orders bill to acquaint civilian manufacturers with the Army's needs.

MAJ. GEN. C. M. WESSON

Among the many industrial leaders and Army officers present were Brig. Gen. Earl McFarland and Brig. Gen. C. T. Harris, the new assistants to the chief of ordnance; E. A. Muller, chief of the Cincinnati ordnance district, and F. V. Geier, assistant chief; W. E. Whipp, vice-president National Machine Tool Builders' Association, and Tell Berna, general manager; Ralph E. Flanders, past president of the A.S.M.E., and Carl Bausch and K. H. Condit, managers; Theodore Trecker, Warner Seely, A. M. Johnson, C. H. Johnson, Hugo Olson, J. E. Lovely, Alex. Sellers, Jr., C. R. Rosborough, Walter Ferris, H. E. Knight, R. J. Kraut.

Impact Testing Featured on A.S.T.M. Program

PHILADELPHIA—Two of the eighteen sessions scheduled by the American Society for Testing Materials for its annual meeting, June 7, July 1, will be given over to several papers in a symposium on impact testing. Jointly arranged by the A.S.T.M. and the American Welding Society through its Welding Research Committee, the symposium will cover the basic theories underlying impact tests, data on the factors affecting impact and the practical application of impact tests to metals, organic plastics and welds. Other groups of papers will relate to radiographic testing and water for industrial uses. The annual meeting will be held at the Chalfonte-Haddon Hall, Atlantic City.

WATCHING WASHINGTON

Roosevelt's axe caused House to pass wage-hour bill . . . Republicans probably hoped law will prove a failure . . . Outlook is more hopeful for educational orders . . . Naval building program can get under way in Fall if Congress should vote funds

McGRAW-HILL WASHINGTON BUREAU
(*Paul Wooton, Chief*)

WASHINGTON—Why the House rushed headlong to pass the wage-hour bill, after recommitting a less drastic version so recently, is hard for any but a full-time political observer to understand. Here's what the Washington experts say:

To strip right down to the bone, it's because congressmen, in the last two months, have realized with a cold chill that Roosevelt can knock them out in the fall elections. They read the writing on the walls of Florida, Alabama, Oregon, and wept.

It doesn't matter if Mr. Roosevelt's Gallup IQ has gone down to the flunking point. It doesn't matter even if there is a remote possibility of beating him in 1940. The point is that the President has his hand on the political guillotine *now*, and he will drop it on any rashly protruded neck. Nobody is just sure whether the public, or even big and little industry, wants a wage-hour bill. But there's no doubt about Mr. Roosevelt.

So the congressmen vote to keep their hides off the fence, now. In doing so they risk the ire of influential employer constituents, but they are few, and their axes wouldn't fall till later. Meanwhile, an opportunity to placate them may show up.

Of course there are other influences in this most controversial of legislation. Many Republicans actually think a wage-hour law would be a fiasco, and would damage the Administration. Vast sections of northern industry which fought the old Black-Connery bill, with its all-powerful board, now turn to favor this one, which sets a flat wage with no regional differentials, and might, therefore, be expected to impede migration of industry to the South. Another thing: the average conservative, who used to hate labor organizations, now even likes William Green and his AFL, by comparison with John Lewis and his CIO. And Mr. Green *wrote* this bill.

What the Senate will do, nobody can tell. The Senate itself doesn't know. Senator Pat Harrison, a smart leader, says he will ask for differentials favoring the South. Whether he can rally sufficient zeal in the heat and confusion of imminent adjournment remains to be seen.

Educational Orders

Educational orders bill was favorably reported by Military Affairs to the Senate May 10. As this is written Rep. Joseph Smith, author of the House bill, which was defeated as a rider on the big navy authorization, is preparing to ask the Rules Committee for a rule to bring it before the House. Two weeks ago sponsors of educational orders legislation were pessimistic on the outlook, which opinion was reflected on this page. But now they feel more hopeful. Wars and threats of wars the world 'round are putting Congress and the public in a slightly more preparatory mood. But obstacles that have defeated repeated attempts for legislation since the World War are still potent. Pacifist and isolationist influence is always strong. And Congress still dislikes to give the War Department power to contract on negotiation rather than a bid basis. It would be difficult to get bids on uncertain developmental, non-commercial work such as educational orders would be. Nevertheless, under statutory limitation of money to be spent—$2,000,000 each year for five years—many on Capitol Hill see no danger in the precedent.

Naval Building

Alacrity with which President Roosevelt announced his intention of asking Congress for money to start laying down vessels under the big navy authorization indicates to Washington militarists that we're off to the gun in the world armament race. Chairman Vinson of House Naval Affairs emerged from the White House saying the President would request $20,000,000 to start work on two cruisers, two large seaplane tenders, two small seaplane tenders, one repair ship, and possibly a 20,000-ton aircraft carrier. Naval building authorities estimate that if Congress votes the money, construction could get under way this fall. Rough plans, of course, are ready, in accordance with Navy custom. But materials, and especially templets and steel shapes, cannot be hurried. Mr. Vinson emphasized the need for the aircraft carrier.

Aircraft for France

The best information in Washington is that the 100 airplanes reported sold to the French government are Curtiss P36 pursuit jobs, with fixed undercarriage. This model is said to be available for export without violation of munitions control law. It would sell for $35,000 a unit.

What Capital Strike?

If there is any truth in talk about a capital strike, which the New Deal thinks is keeping big business from spending a billion a year, it certainly is not affecting the Government. Those who have money to lend are anxious to buy U.S. bonds at microscopic interest. R.F.C. asked for 25 million and was offered a billion. Commodity Credit Corporation, a federal concern, called for 200 million and was offered two billion. Treasury got its last short-term loan at one-fortieth of one per cent.

STIFFER TAXES

Much stiffer taxes next year are a certainty. Not even the most optimistic New Dealers will deny this, though they will give various explanations, especially in regard to the "error" of Congress in going too far in modifying the undistributed corporations earnings tax and the capital gains tax. The two chief factors which will make the tax boost necessary are the falling off in business earnings, and the renewed spending which will follow passage of the pump priming bill.

Virtually everything that is waiting for action by the federal government contemplates greater spending, not smaller. But despite the New Deal's renewed political prestige, there is no likelihood of Congress backtracking on the corporation and capital gains taxes.

Japanese Machinery Shortage Continues

TOKYO—With domestic supply still inadequate and imports more difficult than ever, the Japanese machine-tool shortage has become a serious problem. It is reported that buyers are compelled to sacrifice specifications in order to obtain something to work with. Retooling programs have been completely revised according to the available supply by automotive, aircraft and shipbuilding quarters.

Besides encouraging increased production of lathes and milling machines, under the Machine-Tool Manufacturing Industry Law to be enforced shortly, the Commerce and Industry Ministry officials will give special encouragement to special machines such as high-precision automatic lathes, jig borers, and special kear cutting machines, the *Nikkan Kogyo* reports. Aid will include a subsidy for experimental production. Most machines in this group are imported from the United States, although some Japanese makers have built a few experimental units. Such makers are not operating on a scale large enough to qualify for a license under the Law, hence the special provisions to boost output.

Japanese machinery importers are sensing determined efforts on the part of American manufacturers to expand their market in Japan at the expense of English and German makers. To cope with this situation, the Tokyo office of Alfred Herbert, Ltd., is now placing advance orders with London headquarters, so a large stock may be readily available for immediate shipment, thus mitigating the principal advantage of the Americans: prompt shipment. The normal delay in deliveries from England and Germany is twelve months, with indications that British makers will be able to cater to short-term demand in the near future.

Rationalization

In response to the government's urge for production expansion, Japanese machine-tool firms are abandoning their old policy of producing a "big catalog," concentrating rather on a few models on a large and efficient scale. So the Ikegai Iron Works intends to specialize in lathes, milling machines and radial drills; the Tokyo Gas & Electric Engineering Works in milling machines; the Niigata Iron Works in 30- and 40-ft. lathes; the Karatsu Iron Works on special lathes.

The Shinohara Machine Works has been so far the only firm that has produced machine-tools in accordance with American principles of rationalization, says *"Kikai"* (Machinery), a new Japanese trade publication. The same journal also reports that Shinohara is preparing to construct a new set of plants at Chiba, which will embody principles first adopted by the Ford Motor Co. The plants will have a capacity for producing 80,000,000 yen worth of machine tools annually, twice the present output of all Japanese plants combined.

"For each tool a separate firm" is the principle of the Riken group, which is affiliated with the Institute for Physical and Chemical Research. The Riken Piston Ring Co. is the first successful project of this kind. Now the Riken organization is planning to follow up with a lathe firm, a foundry firm, a chuck firm and a milling machine firm, for all of which construction work is already under way.

April Machinery Exports Were Ahead of Last Year

WASHINGTON—United States exports of industrial machinery during April were valued at $23,672,566, a 10 per cent increase over the shipments in April 1937 valued at $21,518,980, according to the Machinery Division, Department of Commerce.

Shipments abroad of power-driven metal-working machinery continued to show improvement over last year, aggregating $7,861,515 during April compared with $5,119,671 in April, 1936. Greater exports were made of practically all types, particularly the following: Turret lathes, $937,923 compared with $209,899 in April 1937; boring mills and chucking machines, $409,056 compared with $209,898; milling machines, $1,071,305 compared with $783,081; vertical drilling machines, $139,679 compared with $47,691; radial drilling machines, $93,643 compared with $16,824; planers and shapers, $148,534 compared with $27,101; surface grinding machines, $328,892 compared with $216,352.

PERSONALS

STANLEY H. BROWN has been made vice-president and sales manager of Electrol Incorporated, Clifton, N. J., makers of oil burners. Mr. Brown has appointed J. E. LABAHN as assistant vice-president.

JOHN K. MACGOWAN has been elected a director and chairman of the board, Auburn Automobile Co.

Buchrach

WILLIAM A. PURTELL

WILLIAM A. PURTELL, president of the Holo-Krome Screw Corp., and president-treasurer of The Billings & Spencer Co., was elected president of the American Supply & Machinery Manufacturers' Association at the joint annual convention of The National Supply & Machinery Distributors' Association, The Southern Supply & Machinery Distributors' Association, and The American Supply & Machinery Manufacturers' Association at Pittsburgh, on May 11. Mr. Purtell succeeds Roger Tewksbury of the Oster Mfg. Co.

LEON GOODSPEED, one of the best-known machine tool salesmen in the country, on May 31 celebrated his fortieth anniversary as a member of the organization of Henry Prentiss & Co., Inc., New York.

WILLIAM J. MCARDLE has resigned as general sales manager of the Allegheny Steel Co., Brackenridge, Pa., after an association of twenty years. He was closely identified with the development as well as the expansion of electrical and stainless steels. After a short vacation, Mr. McArdle plans to resume business activities in Pittsburgh.

LEE F. ADAMS, formerly associated with the General Electric Co.'s commercial general department has been made manager of the newly formed standards department. Mr. Adams will also act as assistant to the vice-president, E. O. SHREVE. He will have responsibility of co-ordinating all activities pertaining to the development and application of standards throughout the company's organization.

FREDERICK S. CHASE, president of the Chase Brass & Copper Co., Waterbury, Conn., has retired from active management after 51 years' service with the company. He will retain the title of president, however. CHARLES E. HART, vice-president and secretary, has been named executive vice-president, and SEYMOUR SCOTT JACKSON has been promoted from assistant secretary to secretary.

ELLSWORTH S. BLOCK is now a director and L. A. BLACKFORD a member of the executive committee, American Car & Foundry Motors Co.

Bachrach

MARSHALL POST

MARSHALL POST, vice-president of the Birdsboro Steel Foundry & Machine Co., was elected president of the American Foundrymen's Association at the annual meeting. Mr. Post has had an extended career in the foundry industry, and has occupied his present position since 1925.

H. W. GRAHAM, general metallurgist, Jones & Laughlin Steel Corp., has been named vice-chairman of the executive committee of the newly formed Industrial Research Institute, 29 West 39th St., New York City. The Institute is a national organization of scientific research executives of middle-sized and small industries.

JOHN W. HUMPHREY has been made superintendent of production and shipping at the Irvin Works, Carnegie-Illinois Steel Corp.

WALTER M. NONES was re-elected president of the Norma-Hoffman Bearings Corp., at a recent election and ODBERT P. WILSON was elected executive vice-president and treasurer. This action delegates to Mr. Wilson, who has been associated with the company for 24 years, the executive duties and responsibilities which Mr. Nones has carried for 27 years.

J. HOMER PLATTEN has been made a vice-president, The Brill Corp. ERNEST L. NYE has been appointed to the executive committee.

HAROLD H. SEAMAN and IRVING SEAMAN, in charge of operations, Seaman Body Corp., division of Nash-Kelvinator Corp., are relinquishing their association with the company to devote time to private affairs.

HAROLD E. YALE, long associated with the automotive industry, has been elected president of the Pyro-Electro Instrument Co., Detroit, which produces automatic and manual hardness testers. CLARENCE E. SMITH is vice-president and chief engineer. The company recently moved to larger quarters at 7325 West Chicago Blvd.

CHARLES M. GEARING, general works manager of the New Departure Div., General Motors Corp., Bristol, Conn., has resigned and will retire.

OBITUARIES

ANTON FINKL, founder and president, A. Finkl & Sons, forgings, Chicago, died May 10 at the age of 89.

HUGO E. GRIESHABER, supervising constructor for the Electric Boat Co., Groton, Conn., died May 22.

R. C. LEWIS, sales engineer of the Farrell Birmingham Co., died in the crash of a United Air Lines plane at Cleveland on May 24. Mr. Lewis was manager of the rolling mill sales division.

C. L. SCHOONOVER, president and general manager of the Warren Tool Corp., Warren, O., died of a sudden heart attack May 23.

BUSINESS ITEMS

Carnegie-Illinois Steel Corp. has appointed GEORGE A. HIGGINS as assistant manager of sales of the bar, strip and semi-finished materials division. He was previously assistant manager of sales, Pittsburgh district.

Sheffler-Gross Co., Philadelphia, has appointed the Specialty Products Co., Boston, as distributors in the New England states for the "Duoflo" suction and discharge strainers.

Packer Machine Co., Meriden, Conn., builders of automatic polishing and buffing machines, has purchased a new factory at 452-456 Center St., affording approximately 400 per cent more floor space.

Austin-Hastings Co., Inc., Boston, distributor of machine tools, and metalworking and welding equipment, will hold a machine tool show at the Boston Garden Exposition Hall, June 8-11, from 9 a.m. to 9 p.m. each day. It is said that the show will be the most complete metalworking machinery exhibit ever conducted in New England. All machines will be under power and in production. Equipment to be displayed includes: Rockford shapers, Mattison surface grinders, Marvel hacksaws, Fosdick radial drill, jig borer, and upright drills, Sidney engine lathes, Seneca Falls production lathes, Pels shears, Chicago press brakes, Wiedemann turret punches, HPM hydraulic press, Erco sheet-metal forming and flanging machine, Hanna riveters, Pexto sheet-metal machines, Westinghouse arc welders, Thomson-Gibb resistance welders, and Smith oxyacetylene welding and cutting equipment.

The Omer E. Robbins Co., with offices at 635 Mt. Elliot Ave., Detroit, and plant at Ann Arbor, Mich., has been organized by OMER E. ROBBINS, president of the Robbins Engineering Co., Detroit, for the manufacture and sale of the Magna-Sine, a magnetic chuck adjustable to any grinding angle, and a Robbins product for the past two and one-half years.

General Controls, Inc., has transferred its entire factory from San Francisco to the recently completed plant at 700 West Ivy St., Glendale, Calif., where 100 employees will be kept on the payroll.

Acme Electric Welder Co., Huntington Park, Calif., has appointed the following distributors for its spot, press and projection welders and other types of resistance welding equipment: Welding Engineering Sales Corp., 110 East 42nd St., New York; Robert W. Hoffman Co., 13 South Clinton St., Chicago, and Joseph N. Moyer, 465 North Fifth St., Philadelphia.

The Republic Steel Corp. has appointed R. J. SCHULER, formerly general manager of sales, LaSalle Steel Co., Chicago, as general sales representative of the Union Drawn Steel Division, Massillon, Ohio. For the present Mr. Schuler will maintain his headquarters in the Detroit offices.

SKF Steels, Inc., has appointed ANDREW C. GRAHAM as western sales manager with headquarters in Chicago. Mr. Graham was formerly manager of the Chicago office for the Jessop Steel Co.

Grotelite Co. will demonstrate a new injection molding machine at the St. Johns Park Freight Terminal, Spring & West Sts., New York City, from June 6 to July 12. H. J. WILLIAMS, sales manager, will have his headquarters at the Lincoln Hotel, New York, from May 31.

The Los Angeles headquarters of Fray-Mershon, Inc., manufacturer of precision machinery and bench tools, have been transferred to the new factory at 515 West Windsor Road, Glendale, Calif., and E. N. RAHM is in charge of production operations.

Carnegie-Illinois Steel Corp. has appointed J. R. MCELVEEN as office manager of the district sales office at Detroit.

Northwestern Barb Wire Co., Sterling, Ill., has changed its name to Northwestern Steel & Wire Co. Increased diversification of products made a more descriptive name desirable according to J. C. FOSTER, president.

The Oliver H. Van Horn Co., Inc., New Orleans, with branches at Houston, Texas, Shreveport and Baton Rouge, Louisiana, has added the complete line of Stanley electric tools to its stock of supplies and equipment for the industrial and automotive trades.

MEETINGS

AMERICAN ELECTRO PLATERS' SOCIETY. 1938 convention, June 13-17. Hotel Schroeder, Milwaukee. W. J. R. KENNEDY, executive secretary, 90 Maynard St., Springfield, Mass.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Summer convention, June 20–24. Washington, D. C. H. H. HENLINE, national secretary, 33 West 39th St., New York, N. Y.

AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting, June 27-July 1. Chalfonte-Haddon Hall, Atlantic City, N. J.

SOCIETY OF AUTOMOTIVE ENGINEERS. Summer meeting, June 12-17. The Greenbrier Hotel, White Sulphur Springs, W. Va. JOHN A. C. WARNER, secretary and general manager, 29 West 39th St., New York, N. Y.

SHOP EQUIPMENT NEWS

Rivett No. 112 Universal Grinder

Built primarily for medium and large tool-room internal and external grinding, including straight, bevel, two angle or straight and bevel grinding at one setting, the No. 112 universal precision grinder announced by Rivett Lathe & Grinder, Inc., 20 Riverview Road, Brighton, Boston, Mass., is an improvement of the No. 112 internal grinder previously described (*AM*—Vol. 81, page 671). The internal and external spindles, each with individual motor drive, are interchangeably mounted on the cross slide of the machine. Low-speed internal spindle, carrying a wheel up to 6-in. in diameter, also may be used for light external grinding when the

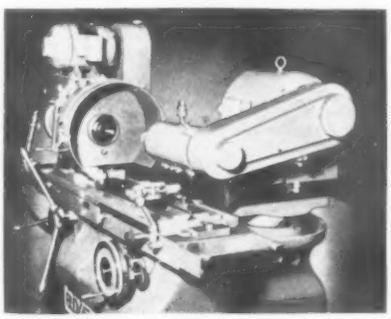


Fig. 1—Internal spindle can be swiveled 90 deg. each side of center. It is driven by a separate 2 hp. motor

work is held in a collet or jaw chuck. Spindle bevel or single taper work is ground by swiveling the workhead or the table top slide.

Reciprocation of the table is controlled by a tapered heart-shaped cam and roller. This cam is designed so as to slightly retard the movement of the table as the center of the stroke is approached and to accelerate immediately the central point is passed. Length of table travel is determined by the lateral position of the roller on the cam. Eighteen selective speeds of table reciprocation are obtained through a gear box. Workhead can be clamped in any position on the upper table. Base of the workhead is graduated to swivel 90 deg. either side of center so that the head can be set for grinding steep tapers. An individual motor provides three selective spindle speeds. Spindle will take collets and split step chucks and spindle nose is threaded for jaw chucks, face plates and other fixtures. Cross slide is carried on a swivel which is graduated to be set in any position up to 90 deg. right or left from center.

Internal spindle mounts in a bracket carried on the cross slide and is driven by an endless flat belt from a 2 hp. motor, as shown in Fig. 1. Rotor of this spindle is carried in precision ball bearings and any expansion of the shaft automatically is compensated. Two spindles are available, one for high speed and the other for low speed. Both spindles use removable arbors for mounting grinding wheels.

The external spindle, shown set up in Fig. 2, is supported by two precision ball bearings at the rear and a bronze bearing at the front, with a pulley between for endless flat belt drive from a 1½ hp. motor. An adjustable wheel guard for 8-in. diameter wheels also provides for mounting the grinding coolant supply nozzle. External grinding wheels are trued by a diamond held in a bracket attached to the spring lever tailstock or on small diameter work by a tip-over diamond fixture. Main

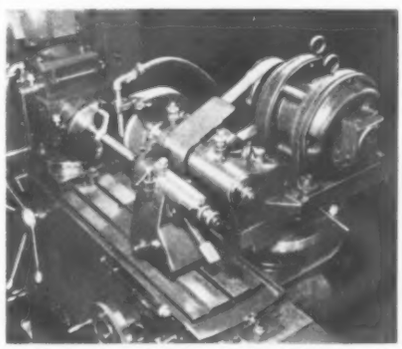
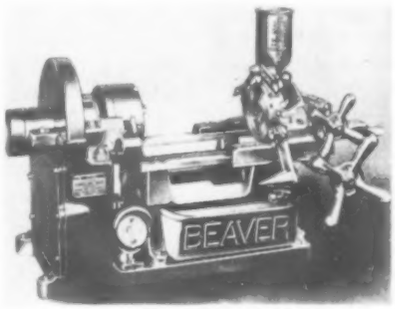


Fig. 2—External grinding attachment for the Rivett No. 112 universal grinder is driven by a 1½ hp. motor and can use 8-in. diameter wheels

drive for this grinder is a 2 hp. motor cradle-mounted on the rear of the sub-base. Drive is by multiple V-belts through a ball-bearing jackshaft. An adjustable toggle and lever mechanism serves to maintain correct belt tension. This motor drives the reciprocating mechanism, the coolant pump and the automatic oil lubrication system.

Specifications: grinding capacity, internal ½ to 8 in.; capacity, ouside diameter, to 8 in.; automatic table travel, ½ to 8 in.; band table travel, 16 in.; swing over table, 14 in.; travel of cross slide, 3½ in.; speeds of workhead spindle 150-380-600 r.p.m.; height of workhead spindle from floor, 50 in.; floor space, 55x40 in.; net weight, with motors and internal or external spindle, 3,700 lb.



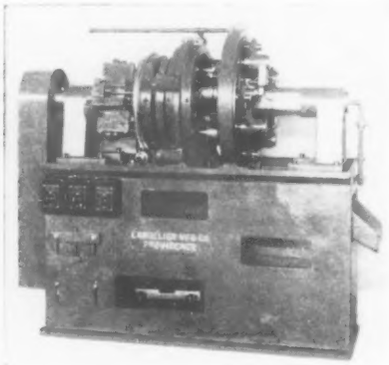
Beaver Model-B Pipe Machine

Having capacity to cut, thread and ream nine sizes of pipe from ⅛ to 2-in. diameter, the Model-B pipe and bolt threader offered by Beaver Pipe Tools, Inc., Warren, Ohio, can be arranged with a drive shaft and geared tools to cut and thread 2½ to 12-in. pipe. It will cut off solid bolt rounds up to 1-in. and 2-in. bolts may be threaded in one cut. This machine may be purchased in units, starting with the simple Model B power drive, which can be used to operate all makes of hand pipe threaders, cutters and reamers. This drive unit also can be used with a drive shaft to operate geared tools to cut and thread pipe

up to 12-in. in diameter. Base of the complete Model B unit measures 27¼x13⅛ in. and the machine is 20½ in. high. Weight of the complete unit is 325 lb. Die heads are removable and interchangeable.

Langelier Continuous Cap Screw Trimmer

Langelier Mfg. Co., Providence, R. I., has designed and built this horizontal, four-spindle continuous machine for trimming the heads of socket-type cap screws after the drawing operation. The entire carrier revolves with four rotating



collet type chucks, a fixed cam operating the cutter levers. Pieces are hand loaded and, after the turning operation is completed, they are ejected automatically.

Three motors are used, one for driving the spindles, a second for revolving the carrier, and a third on the lubricant pump which supplies coolant to the tools. The collet-type chucks have interchangeable pads for handling No. 8 to $\frac{5}{16}$-in. screws. Speed of the carrier is adjustable for the various sizes and the production rate ranges from 1,000 to 1,500 pieces per hour. Floor space required is 67 x 26 in.

Royce "Drive-Matic" Automatic Drill

Royce Machine Co., 2418 W. Madison St., Chicago, Ill., offers the double "Drive-Matic" automatic machine for drilling and tapping small metal parts and fittings. This unit is designed to complete two operations on one piece at a time, at a speed of 1,200 pieces per hour. Approximately 2,500 pieces per hour can be produced when only one operation is required.

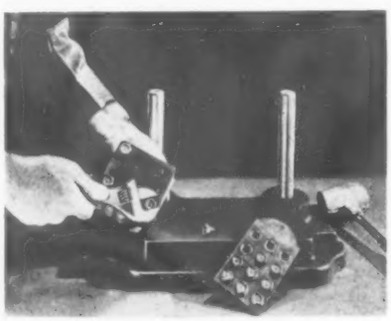
All metal pieces are dropped into one of the twelve "Lock Jaw"

chucks on the revolving turntable as it passes the operator. The piece then is indexed automatically to the first station where it is locked solidly for the drilling operation. Next, the revolving table moves to the second station where the high-speed tapping unit lowers and taps the threads. Finally, in the third station, air pressure ejects the piece.

Almost every kind and shape of small metal parts in sizes up to ¾ in. can be inserted without changing set-ups. Heads are driven independently by cam drives. Radial dial table, chucks and heads are synchronized for accurate performance.

Nielsen Hardened Transfer Screws

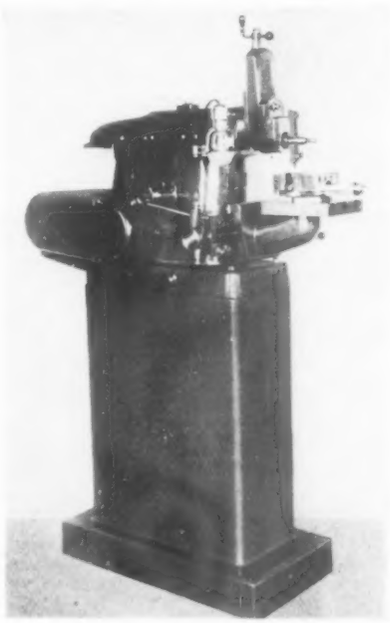
Providing an accurate and speedy way of transferring the layout blind screw holes, transfer screws offered by Nielsen Tool & Die Co., 1861 Gardner Ave., Berkley, Mich., are available in seven sizes. These screws are made with heads of uniform height so that holes of different sizes in the same plane can be transferred at one time. By inserting the



screws into holes to be transferred, then striking the section a solid blow, the center and drilled circle of the desired hole is transferred to the piece to be drilled. Available sizes range from ¼ to ¾ in. diameter.

Young "Shapemaster" 6-in. Bench Shaper

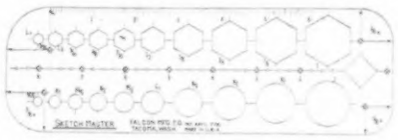
Cutting speeds ranging from 0 to 122 ft. per min. are possible with the 6-in. stroke "Shapemaster" bench shaper offered by Young Engineering Laboratories, Inc., 72 W. Fillmore Ave., St. Paul, Minn. This machine has a universal table that swivels in the vertical plane a full 360 deg. In the horizontal plane, the table swivels 210 deg. and it is claimed that no swivel vise is required for any work. Total vertical travel of the tool head is 5⅞ in. and the clapper box swings



through an angle of 30 deg., while the head swings through an angle of 90 deg. Screw adjustment is provided for the ram which is 20 in. long and has a 14-in. guide in the housing.

Ram drive is a conventional Whitworth quick-return motion, the gear reduction being entirely inclosed in the frame. Stroke is variable from 0 to 6 in. by changing the length of the crank on the bull gear. A standard ¼-hp. motor is used to drive the ram at speeds of 45, 67, 97 and 140 strokes per min. Over-all lengths of this machine is 37 in. and width is 23 in. Height of the bench-type unit is 29 in. while

height with a stand is 59 in. Net weight of the bench unit is 250 lb. Table has a horizontal travel of 9¾ in., and maximum distance from table to ram is 5¼ in. Table measures 8 in. long by 6 in. wide. Reversible power feed is provided for the table; feeds range from 0.003 to 0.021 in. in 0.003 in. increments. A 4 in. wide vise that opens 4 in. is provided.



"Sketchmaster" Drafting Tool

Designed to facilitate rapid yet accurate sketching and drafting, the "Sketchmaster" tool offered by Falcon Mfg. Co., 5419 S. Puget Sound Ave., Tacoma, Wash., has radii of ⅝, ¾, ⅞, and 1 in. at the four corners, each centering at a punched pencil point opening. Ten graduated and centered circles and hexagons ranging from 3/16 to 1 in. are provided.

Gopher Quick-Lead Two-Lip Counterbore

Of one-piece construction with a solid pilot, the tool room counterbore developed by Gopher Machine & Tool Works, 51 Royalston Ave., Minneapolis, Minn., is claimed to be free cutting. Sizes are available for standard sockethead screws. This two-lipped counterbore is easy to sharpen and is made oversize so that it can be reground a number of times before it is reduced to substandard dimensions.

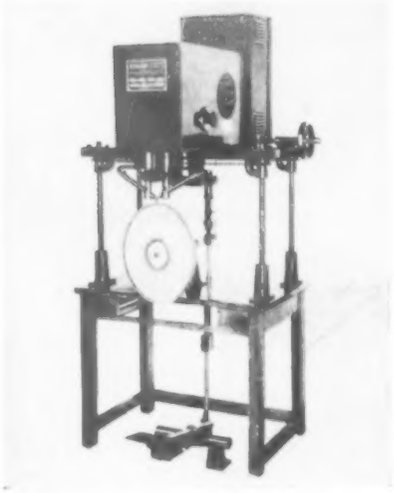
Chicago "Avioflex" Cellulose-Sealed Hose

A specially prepared cellulose sheet that is impervious to oils and hydrocarbon fluids under elevated, normal and subnormal temperatures is used to seal the "Avioflex" flexible metal hose offered by Chicago Metal Hose Corp., Maywood, Ill. Inner core of this hose is a flexible metal tube of spiral construction, formed in such a way as to protect the cellulose covering against abrasion. The cellulose laminations are drawn into the spiral corrugations of the metal core, insuring flexibility. A vulcanized synthetic rubber cover binds the unit together and gives added strength and body. Over this rubber cover is a metal braid which protects the cover and prevents elongation under internal pressure and external end load. "Avio-Tite"

detachable couplings are available for use with this hose. These couplings use the cellulose element in the hose to form a positive end seal which prevents the conducted fluid from touching the synthetic rubber cover. Inside diameter of standard section hose ranges from 5/32 to 1¼ in. while the outside diameter ranges from ½ to 1 23/32 in. Bending radius at the axis ranges from 3¼ in. to 10 in. for this hose.

Eisler No. 210-JMS Special Welder

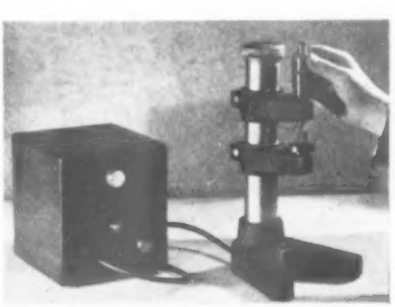
Specially designed for joining the ends of the metal binder on asbestos core gaskets, the No. 210-JMS welding machine offered by Eisler Engineering Co., 745 S. 13th St., Newark, N. J., is arranged so that both welding electrodes contact the top of the work. This overhead spot welding prevents the gasket from unwinding by joining the end of the binding strip to that part of the strip directly beneath it in two or three spot welds. Machine is



provided with a hand wheel for raising or lowering the electrodes to the welding position. Gaskets ranging from 4 to 16 in. in diameter can be welded. Flow of current during the welding operation is controlled by a timer and contactor built into the unit. Production is approximately 600 gaskets per hour.

Carson Electronic Sensitive Micrometer

Measurements of dimensions to within 0.00005 in. with no contact pressure and no human element in setting the micrometer are said to be possible with the Carson electronic micrometer offered by Instrument Specialties Co., 70 Paterson Ave., Little Falls, N. J. This instrument consists of a stand and column supporting an adjustable work table and micrometer head. Electrical connections from the



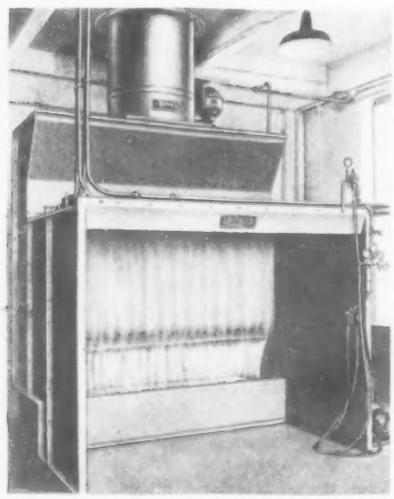
stand are plugged into a small separate cabinet housing the electronic unit. On the front of the cabinet a large bull's eye lens glows at the first instant of metal-to-metal contact between the sharp micrometer and the surface being measured.

Work table is adjustable on the

micrometer stand both vertically and around the column, then clamped firmly at the desired position. The micrometer head is adjustable vertically by turning the knurled handwheel at the top to set the micrometer accurately to zero. Micrometer head and work table are removable and interchangeable. Measurements can be made against highly polishd surfaces, ball bearings and races, gages and mirror surfaces without marring the work. Soft and ductile materials, such as thin copper, or aluminum, can be gaged without deforming the metal. Non-conducting materials are measured by placing a steel plate over the work. Standard model operates from any 110-volt a.c. supply; d.c. models also are available. This unit regularly is supplied with an over-size micrometer head reading to 0.001 in. Special heads having a large drum with graduations for every 0.0001 in. are available.

Binks "Dynaprecipitor" Spray Booth Chamber

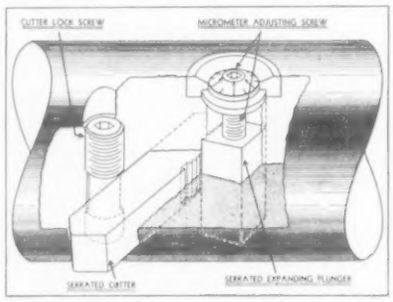
Binks Mfg. Co., 3114–26 Carroll Ave., Chicago, Ill., offer the "Dynaprecipitor" to take the place of the ordinary water-wash chamber for spray booths. This unit is said to reclaim all types of paints, synthetic enamel and vitreous enamel. It has no nozzles and is economical to operate. An efficiency of 99 per cent is claimed for elimination of paint pigments from spray fumes. This unit is equipped with a set of precipitor plates which are self-cleaning. Water curtain extends the full width of the spray booth and pigments which strike this curtain are washed down into the collecting pan, thereby eliminating the need for cleaning the front surface of the unit.



Ideal Brush-Type Wire Stripper

A motorized brushtype wire stripper, particularly suitable for stripping fine wires, has been introduced by the Ideal Commutator Dresser Co., 1057 Park Ave., Sycamore, Ill. This machine is claimed to strip cotton, silk, enamel, string asbestos covered

wires and fine "Litz" wires cleanly and to remove gummy insulation embedded in stranded wires. Driven by a ¼ hp. motor this stripper has heavy metal guards in front of the revolving wire brushes and over the driving belts. A thumb adjustment screw varies the distance between the brushes for various sizes of wire, while an adjustable stop behind the brushes fixes the length of stripping.

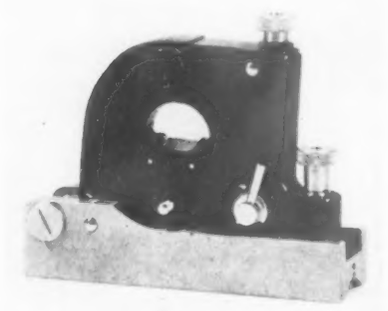


Davis Micrometer Fly Cutter Tool

Suited for straight through boring, shoulder and counterboring, and, in some instances facing and chamfering operations, the "Super-Micrometer" fly cutter tool announced by Davis Boring Tool Div., Larkin Packer Co., 6200 Maple Ave., St. Louis, Mo., is claimed to adjust accurately to 0.00025 in. on diameter. This tool not only expands but contracts the cutter, movement being controlled by means of a serrated plunger which moves perpendicular to the cutter and is controlled by the graduated micrometer adjusting screw. Full travel of the plunger permits setting the cutter up to the next serration. Direct thrust of the boring operation is taken on the serrations, not on the screw. Cutter bit is locked in position by a counter-clockwise rotation of the eccentric lock screw. This tool can be made for bores ranging up from 1-in. in diameter.

B. & L. Improved Optical Protractor

An improved optical protractor for measuring and checking angular relation between surfaces, edges and holes, has been developed by Bausch & Lomb Optical Co., Rochester, N. Y., for production work and



toolroom applications. Said to equal the 5-in. sine bar in accuracy, this instrument is direct reading. Angles to 1 min. of arc can be read from the sale. Base of the instrument is adjustable, making it possible to correct the protractor for inaccuracies from the true level in the bed of the machine. In the instrument a ring center revolves, carrying with it a level vial and protractor scale which are viewed through an eyepiece. After truing the base, the center ring is revolved by hand or by micrometer screw until the required angle appears in the scale. The protractor then is placed on the work, which is turned until the level bubble becomes central.

Heim Self-Contained Roller Bearings

Self-contained roller bearings offered by The Heim Co., 20 Sanford Ave., Fairfield, Conn., are assembled with rollers in any one bearing held within limits of 0.0001 in.; these rollers being completely inclosed within the roller race. Openings in the end flanges are but several thousandths of an inch larger than the diameter of the shaft on which the bearing is to be used. This is effectively claimed to retain lubrica-

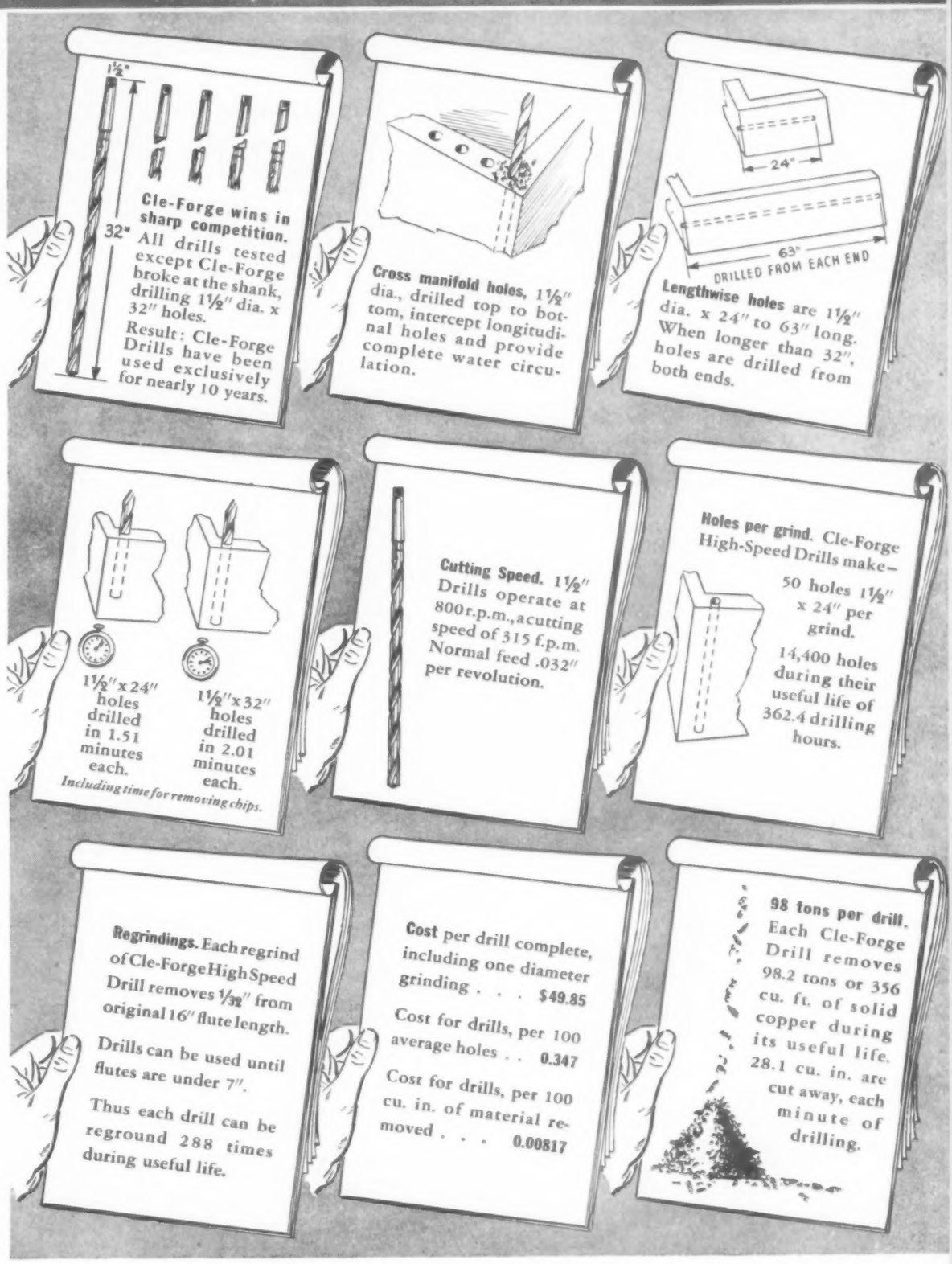
PROGRESS
IN MANUFACTURING DRILLS AND REAMERS

Large metal refining company uses vertical molds open at top and bottom for casting copper into cakes and billets preliminary to producing bars and sheets.

The molds themselves are also of pure electrolytic copper, with 4-inch walls. During casting, each mold is kept cool by means of continuous streams of water, circulating rapidly within its four walls.

The water-passages are produced with Cle-Forge High-Speed Twist Drills exclusively—and their excellent performance has not only greatly simplified this unique drilling operation but has greatly reduced costs.

The facts outlined in this advertisement are based upon an impartial survey made by a firm of independent engineers. For complete details of this Performance, ask us to send you Survey No. 91.


1½"
32"
Cle-Forge wins in sharp competition. All drills tested except Cle-Forge broke at the shank, drilling 1½" dia. x 32" holes.
Result: Cle-Forge Drills have been used exclusively for nearly 10 years.
Cross manifold holes, 1½" dia., drilled top to bottom, intercept longitudinal holes and provide complete water circulation.
24"
63"
DRILLED FROM EACH END
Lengthwise holes are 1½" dia. x 24" to 63" long. When longer than 32", holes are drilled from both ends.
1½" x 24" holes drilled in 1.51 minutes each.
1½" x 32" holes drilled in 2.01 minutes each.
Including time for removing chips.
Cutting Speed. 1½" Drills operate at 800 r.p.m., a cutting speed of 315 f.p.m. Normal feed .032" per revolution.
Holes per grind. Cle-Forge High-Speed Drills make—
50 holes 1½" x 24" per grind.
14,400 holes during their useful life of 362.4 drilling hours.
Regrindings. Each regrind of Cle-Forge High Speed Drill removes 1/32" from original 16" flute length.
Drills can be used until flutes are under 7".
Thus each drill can be reground 288 times during useful life.
Cost per drill complete, including one diameter grinding . . . $49.85
Cost for drills, per 100 average holes . . 0.347
Cost for drills, per 100 cu. in. of material removed . . . 0.00817
98 tons per drill. Each Cle-Forge Drill removes 98.2 tons or 356 cu. ft. of solid copper during its useful life. 28.1 cu. in. are cut away, each minute of drilling.

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49th STREET
CLEVELAND

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

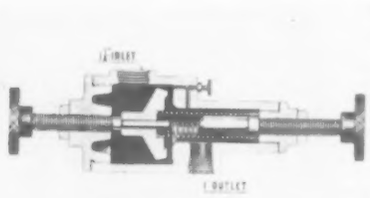
30 READE ST. NEW YORK · 9 NORTH JEFFERSON ST. CHICAGO · 634 HOWARD ST. SAN FRANCISCO
6515 SECOND BLVD., DETROIT · LONDON - E. P. BARRUS, LTD., - 35-36-37 UPPER THAMES ST., E.C.4

"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

tion and prevent foreign matter from entering the roller race. Bearings are standardized in inch dimensions and are manufactured to limits commensurate with recognized standards of precision bearings. Standard bearings are listed for shaft diameters of $\frac{3}{8}$ to $1\frac{1}{2}$ in. and have normal outside diameters of $\frac{13}{16}$ to $2\frac{1}{2}$ in.

Murray-Lorge Automatic Valve

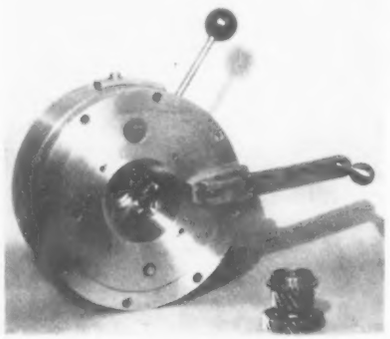
An automatic shut-off valve designed to be placed in the supply line above flexible hose used for compressed air, steam, gas or fluids under pressure, has been announced by D. J. Murray Mfg. Co., Wausau, Wis. Listed as the "Murray-Lorge" valve, this unit is claimed to immediately



shut off the supply when there is a break in the hose or it becomes disconnected. The valve operates on the principle of equalization, that is, as long as the pressure on the inlet and the outlet side are nearly, or exactly the same, the plunger is maintained in an open position by means of a spring.

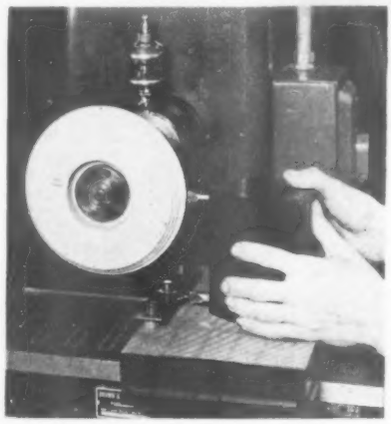
Garrison "Duplex" Gear Chuck

Design of the Duplex gear chuck offered by Garrison Machine Works, Inc., Norwood Power Bldg., Dayton, Ohio, makes possible chucking on any two gears of a cluster gear unit instead of the conventional method of locating on the two end gears of the cluster. As a result, the gear maker can determine what gears of the cluster unit are most important, then chuck on them regardless of their size or position. In use, the operator inserts the gear into the chuck and moves the ball handle until the rear set of chuck members come into mesh with the teeth of the gear. Then the front operating lever is moved and both front and rear sets of chuck members operate to center the cluster true with the pitch line and clamp it securely.



Cleveland Suspended-Seat Hoist Carrier

One man can handle the entire storage operation for kegs, drums, bales and crates with the suspended-seat hoist carrier developed by Cleveland Tramrail San Francisco Co., 82 Beale St., San Francisco, Calif. Although on independent hoist cables, both the load and the seat are operated from the same hoisting element at the top. By means of this arrangement, the operator always is abreast of the load and when the hook goes down to get the load the operator goes with it in a safe seat. Piling height is not limited and the operator is claimed to be just as safe 60 ft. above the floor as 10 ft. The placing of every tier can be supervised closely. Grabs of different types can be mounted on this unit for handling materials of various types. Controls are mounted near the operator's seat for movement of the carrier vertically and horizontally.

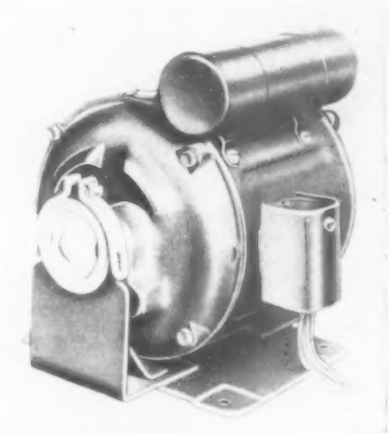


Sneed "Copy Cat" Wheel Dresser

Diamond and follower of the "Copy Cat" wheel dresser, offered by Sneed Mfg. Co., 197 Scotten Ave., Detroit, Mich., are of the same shape and size. The diamond follows exactly parallel paths with the follower, thus reproducing exactly the shape and size of the templet in the wheel surface. Any exposed portion of the diamond can be used for dressing the wheel and this unit can be used on any type of grinder. Templets to guide the dresser are made from $\frac{1}{16}$-in. stock and mounted on the table or bed of the machine.

Wagner Type RZNR High-Torque Motor

Annular resilient mountings are provided in the Type RZNR high-torque double-capacitor single-phase motors offered by the Wagner Electric Corp., 6400 Plymouth Ave., St.



Louis, Mo. These motors are available in $\frac{1}{3}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 hp. ratings for 110 and 220-volt service. Companion Type RZN motors are equipped with rigid mountings.

These motors have two conden-

it's new

..and REALLY AUTOMATIC

A NEW INTERNATIONAL TIME RECORDER

"EASY FOR ME TOO!"

"Nothing to do but insert my card. No levers or anything else to punch. Makes it easy to be my own timekeeper!"

NOW ON DISPLAY AT YOUR NEAREST INTERNATIONAL OFFICE . . . COME IN AND SEE IT TODAY

INTERNATIONAL BUSINESS MACHINES CORPORATION

World Headquarters Bldg., 590 MADISON AVE., NEW YORK, N. Y. • *Branch Offices* IN PRINCIPAL CITIES OF THE WORLD

sers of different value; a high value of capacitance for starting and a low-value for running. Change in capacitance occurs at approximately 75 per cent full-load speed by means of a centrifugal switch located on the motor.

Durez No. 2274 Molding Compound

Developed for molding parts with especially large inserts which are subject to extremes of temperature, Durez No. 2274 molding compound announced by General Plastics, Inc., North Tonawanda, N. Y., is comparable with standard compounds, except that the final set is slightly more flexible. This material is said to be adaptable for use with terminal studs, brush holders and similar inserts.

P&H Pillar-Type Balanced Jib-Crane

A self-supporting pillar-type jib-crane for work in side bays, low headroom areas and other confined spaces where overhead traveling crane or hoist service is not practical, is offered by the Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis. These P&H jib cranes are available in capacities up to 5-tons with heights up to 20 ft. and

a maximum radius of 20 ft. Furnished either with the standard pendant rope or pushbutton controls on the electric hoist or with the recently announced master variable speed controller. Jib arm is balanced and swings on roller bearings.

"American Optical" Improved Respirator

Designed to provide maximum comfort for the wearer, this respirator offered by the American Optical Co., Southbridge, Mass., is claimed to prevent silicosis if worn faithfully. Facial adjustment is said to be un-

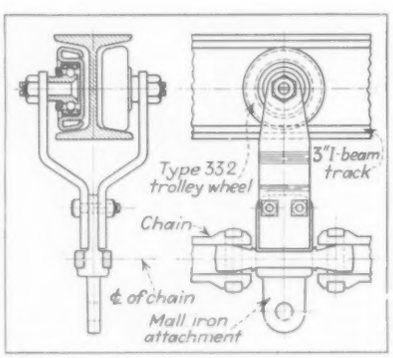
necessary and improved valves make inhalation and exhalation easy. Design is such that vision is not obstructed and the respirator can be kept in efficient working order easily.

Manhattan "Grenadier" Air Drill Hose

The Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic, N. J., has developed the "Grenadier" air drill hose, which has an inner tube of gas and oil proof synthetic rubber. This hose is constructed with two or three braids of strong, long-staple cotton cord. Between these are placed sheets of live rubber which vulcanization forces into the cord, forming one unit. This hose is available in regular sizes from $\frac{1}{4}$ to 2 in. in diameter.

Mathews Light-Duty Overhead Trolley

Having a capacity of 150 lb., a lightduty all-purpose anti-friction trolley suitable for use with the endless-chain power-operated type trolley conveyors, or as an individual manually-operated trolley, has been



announced by Mathews Conveyor Co., Ellwood City, Pa. Outer shell of this trolley is of $\frac{1}{8}$-in. case hardened steel. The ball bearing used incorporates a seal composed of a steel and felt labyrinth. Drawing indicates the assembly of a complete two-wheel trolley mounted on a 3-in. I-beam track.

Page "Hi-Tensile G" Welding Electrode

Recommended for positioned fillet and general flat welding, the "Hi-Tensile G" welding electrode announced by Page Steel and Wire Div., American Chain & Cable Co., Inc., Monessen, Pa., is of the shielded-arc type, suitable for use with either motor generator or transformer-type machines. Welds made with these electrodes are claimed to have a tensil strength of from 65,000 to 70,000 lbs. per sq. in. and to have a ductility of from 25 to 35 per cent in 2 in. Impact resistance is from 40 to 69 ft. lb. Izod. Stress relieved welds are said to show a slightly lower tensile strength but have considerably higher ductility. Regularly furnished in 14-in. lengths, these electrodes are available in $\frac{5}{32}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$ and $\frac{3}{8}$-in. diameters. The three larger sizes can be furnished in 18-in. lengths as well as 14-in. lengths.

Thor Model 7E-1 Easy-Flow Spray Gun

Designed so that heavy materials, such as asphalt paints, sound deadner materials containing sand and other abrasives, will flow easily through the rounded contours from the material inlet to the material nozzle, the Thor Model 7E-1 spray gun announced by Binks Mfg. Co., 3114–26 Carroll Ave., Chicago, Ill., is available with a variety of nozzle set-ups. Material inlet opening is $\frac{3}{4}$ in. in diameter. This gun is of

the internal atomization type and nozzles can be furnished to deliver either round or flat sprays.

Ohio Welding Nuts

Provided with four welding points or projections which are all of uniform height, thereby insuring satisfactory flow of electric current through the points of contact, welding nuts offered by the Ohio Nut & Bolt Co., 600 Front St., Berea, Ohio, are available in sizes up to and including $\frac{3}{8}$ in. Welding points are so spaced as to obviate any difficulty in setting up the necessary electrodes on welding machines or from molten metal splashing into the threads. These nuts may be welded to sheet metal and serve not only for attaching threaded parts, but blank nuts can be used to provide bearings of the through- or collar-type for shaft or push rods. Spring clips, fastened to the upper electrode by a hose clamp and extending over the end enough to grip a nut, will permit the operator to use both hands in handling the work and assure proper location of the nut.

Manhattan "Paranite" Oil-Proof Wipers

Developed to replace felt wipers on lathes, planers, grinders and other machine shop equipment, "Paranite" oil-proof synthetic rubber wipers announced by The Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic, N. J., are claimed not to absorb grit, metal chips or abrasive material. These wipers are molded in sizes to suit the machines on which they are to be used and are installed to insure close tolerances between moving parts. They are said to be resistant to the effects of oil, acid or other liquids.

Spencer "Klixon" Disk Thermostat

Spencer Thermostat Co., Attleboro, Mass., is offering the "Klixon" disk-operated overheat protection thermostat for use in fractional horsepower motors. This thermostat contains no magnets, springs or toggles and protects the motor against overheating from any cause, yet interferes with the motor's operation only when overheating is a definite danger. It consists of a small thermostatic bimetal disk placed next to a heater wire. Contacts, welded to the disk, provide positive action and, being placed in series with the line circuit, the thermostat, when open, breaks the control circuit. In operation, this thermostat follows closely the heat rise in the motor windings and compensates automatically for varying ambient vs. load conditions and permits the motor to operate up to its peak safely under all conditions. It is applicable over the complete range of single phase a.c. fractional horsepower motors up to and including 1 hp. units operating on 110 and 220 volts. These units are available with manual or automatic reset.

G. E. Offers Three Welding Electrodes

Intended for shielded-arc welding of mild steel, three arc welding electrodes, each protected by a heavy

DON'T

Close Your Eyes

to

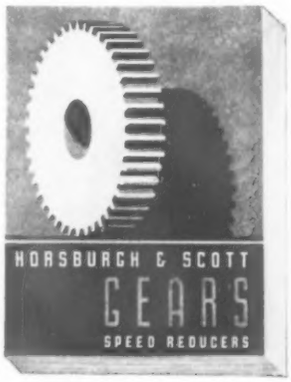
PROVED

GEAR FACTS

Consider These 8 Advantages

1. Gears are individually fitted to your needs . . . yet standardized as to size and design for economy in manufacture.
2. No pattern or tool charges except for very special gears.
3. Pleasing heavy pattern design.
4. Accurate machining and cutting to specifications.
5. Finest materials exactly to specifications.
6. A complete service . . . gears from the largest to the smallest in industrial use.
7. Prompt quotations and deliveries.
8. Gear specialists for over 50 years . . . an organization that knows the engineering and art of gear making. An organization that can save you money and help you in your problems of industrial power transmission.

Your name on your company letterhead brings you this valuable 448-page catalog that illustrates and describes a complete line of all types of Speed Reducers and Gears.



THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVE., CLEVELAND, O., U. S. A.

extruded coating, have been announced by General Electric Co., Schenectady, N. Y. The Type W-20E electrode is designed especially for general-purpose, single- or multiple-pass arc welding of mild steel in any position. It is recommended for operation with a.c. or d.c. equipment and is said to be particularly suitable for high-speed, single-pass welding and for jobs where fit-up is likely to be poor.

Type W-22E electrode is a fast-melting, smooth-flowing electrode with which dense deposits can be made without slag inclusions or gas pockets. Although vertical and overhead welding with this electrode usually is done with a $\frac{5}{32}$-in. size or smaller, the $\frac{3}{16}$-in. size can be furnished with two types of coatings, one for overhead and vertical work and the other for horizontal welding. It is recommended for use with d.c. of reverse polarity. The Type W-23E electrode is suited for arc welding mild steel in the flat position and is claimed to have good ductility. This is a high-current rod, so that the weld metal is fluid and is claimed to wash up well on the side walls of deep-groove and fillets. A modification of this electrode also is available with a heavy-taped coating in coils for automatic welding.

HIGH in
• cutting quality
• stability
• anti-rust value
Stuart's
"KLEEN-KUT"
TRADE MARK REGISTERED
SOLUBLE CUTTING OIL
Phone or write today for Free Working Sample of this low priced modern soluble oil.
D. A. STUART OIL CO. Ltd.
CHICAGO, U. S. A. - - EST. 1865
Warehouses in Principal Industrial Centers

New 24 page illustrated booklet entitled "Soluble Cutting Oil at its Best" available to personnel of metal working plants. To obtain free copy please write to 2727 South Troy Street, Chicago, using company letterhead and stating your position.

Heim Hardened Dowel Pins

Manufactured from an alloy steel and heat-treated and ground to a tolerance of 0.0002 in., standard dowel pins offered by the Heim Co., 20 Sanford Ave., Fairfield, Conn., are stocked in two groups. Group A is ground 0.0002 in. over nominal diameter for regular use, while Group B pins are ground 0.001 in. over nominal diameter for repair work and use where holes have become enlarged. These pins range in size from $\frac{1}{8}$ in. diameter by $\frac{1}{2}$ in. long to $\frac{7}{8}$ in. diameter by 4 in. long.

U. S. Crepe Finish Package Conveyor Belt

Developed especially for conveying various types of packaged material on a greater degree of incline than is normally encountered, the crepe-finish package conveyor belt announced by United States Rubber Products, Inc., 1790 Broadway, New York, N. Y., is said to be easily cleaned. This belt is furnished on 28- and 32-oz. duck with the special crepe finish cover on the carrying side. Minimum top cover thickness is $\frac{1}{16}$ in. This may be increased as required.

TRADE PUBLICATIONS

ARC WELDERS A 16-page bulletin, No. GEA-1440G, published by General Electric Co., Schenectady, N. Y., discusses the features of several Type WD single-operator arc welding units.

CLEANING A folder entitled "Steam Clean with Hypressure Jenny" offered by Homestead Valve Manufacturing Co., Inc., Coraopolis, Pa., discusses a number of applications of this unit in industrial plants.

DOWEL PINS Bulletin No. 15 offered by The Heim Co., Fairfield, Conn., lists standard alloy steel,

hardened and ground dowel pins available for delivery from stock.

ENGINE LATHES "Stremeline" lathes, available in 10, 12 and 13 in. sizes, are described in a 6-page bulletin, Form No. 1112, announced by the Sebastian Lathe Co., Cincinnati, Ohio.

ENGINES A 36-page booklet, illustrating various installations of diesel and gas engines has been published by Worthington Pump & Machinery Corp., Harrison, N. J. This bulletin, No. S-500-B13, contains almost 100 illustrations of engines in service.

FINISHING A catalog devoted to the maintenance of metal, concrete, wood, glass and composition surfaces with various types and colors of paint is being distributed by the Skybrite Co., Cleveland, Ohio.

FUSE WEDGES "Loctite" fuse wedges, used in Type A safety switches of 200 amp. capacity and larger, are described in a folder now being distributed by the Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio.

GENERATORS Type B d.c. generators and exciters are discussed in Bulletin No. GEA-1607B, offered by General Electric Co., Schenectady, N. Y.

GRINDER Catalog No. N-38, offered by Landis Tool Co., Waynesboro, Pa., discusses the features of the 16-in. type D hydraulic crank pin grinder. Illustrations show setups for various jobs.

HANDY & HARMAN "Carrying on a Tradition" is a title of a 12-page booklet published by Handy & Harman, 82 Fulton St., New York, N. Y. Giving a brief history of the company, this booklet also brings to the reader a brief review of the personalities in the present organization.

HYDRAULIC COUPLING Variable speed hydraulic couplings for use in connection with a constant speed motor, the speed of the driven machine being controlled by regulating the quantity of fluid in the coupling, are described in Bulletin No. 3119, offered by Hydraulic Coupling Division, American Blower Corp., 632 Fisher Bldg., Detroit, Mich.

LIFT TRUCKS Pallet-type hydraulic lift trucks designed especially for use with two-faced pallets are described in Bulletin No. 111 published by Lyon Iron Works, Greene, N. Y. A suggested design of pallet for use with these trucks is shown.

LATHES Type L cone-head lathes, Type M geared-head and Type H geared-head lathes, are described in Bulletins Nos. 1115, 1116, and 1117, published by the Sebastian Lathe Co., Cincinnati, Ohio.

MACHINE TOOLS "Let Me Tell You About Machine Tools" is the title of a booklet recently published by the National Machine Builders Association, 10525 Carnegie Ave., Cleveland, Ohio. This booklet was written by a machine operator who tells in his own words what machine tools are, what they do and something about the men who operate them. It is profusely illustrated.

PLUMBING A 32-page booklet covering a wide range of plumbing equipment and discussing the importance of proper sanitation in industry is offered by Crane Co., 836 S. Michigan Ave., Chicago, Ill.

PRODUCTION LATHES Dealing exclusively with rapid production lathes, a 16-page bulletin No. 11-19

Modern in all respects Jacobs Ball Bearing Super Chucks are fitting complements to the world's most advanced machine tools.

IF IT'S A

Jacobs

IT HOLDS!

THE JACOBS MANUFACTURING COMPANY
HARTFORD CONNECTICUT, U.S.A.

R.P.438, announced by The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, tells an informative story regarding these lathes. Entitled "Doubling Production Per Hour," this bulletin describes the features of the lathes and some special tool set ups that have been arranged for particular jobs.

REDUCERS Catalog No. 150, offered by D. O. James Mfg. Co., 1120 W. Monroe St., Chicago, Ill., lists herringbone, worm, bevel and spur gear speed reducers, and flexible couplings.

RECONDITIONING "Reconditioning Flooded Electric Equipment" is the title of Bulletin No. GEA-2571B offered by General Electric Co., Schenectady, N. Y.

ROLLER CHAIN Data Book No. 1757, announced by Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill., gives information on "Silverlink" roller chain and sprockets for drives and conveyor uses. This 174-page book gives practical information, application pictures and engineering data, including information on several new chains.

SAFETY "For Greater Safety" is the title of a 4-page circular issued by Lewis-Shepard Co., 117 Walnut St., Watertown, Mass. This circular, No. 323, discusses safe methods in the indoor transportation of materials.

SCREENS "Vibroplane" screens built in single or multiple deck models and powered by the Ajax-Shaler shaker, are described in a four-page bulletin No. 25, offered by Ajax Flexible Coupling Co., Westfield, N. Y.

SPINDLES Use of seamless steel tubing for spindles and other machine parts is discussed in a mailing folder being distributed by Summerill Tubing Co., Bridgeport, Montgomery Co., Pa.

STEEL PLATES "Carbon Steel Plates" is the title of Section 6 of the "Steel Products Manual" being published by the American Iron & Steel Institute, 350 Fifth Ave., New York, N. Y. Plates are classified by size and quality. Price, 15 cents per copy.

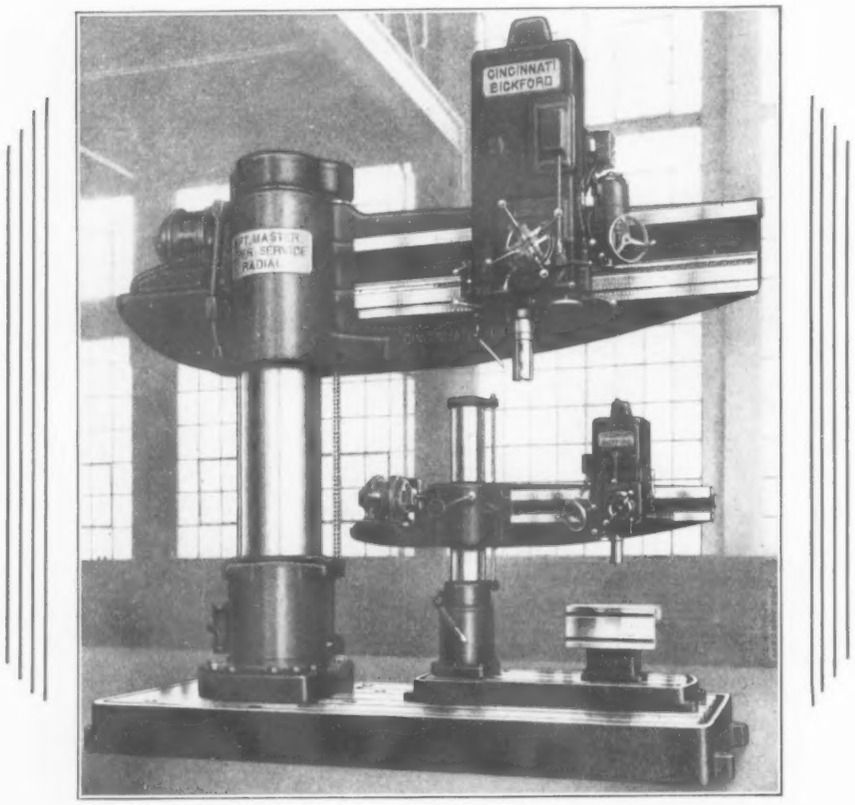
TAP EXTRACTORS A folder, No. 132, discussing the features of tap extractors, is offered by the Walton Co., 96 Allyn St., Hartford, Conn. These tools, developed especially for backing out broken taps, are available in 2, 3 and 4-flute styles for taps up to 1½ in. in diameter.

TEMPERING Catalog No. T-625, offered by Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa., is entitled "The Homo Method for Tempering" and shows many varieties of work now being tempered, annealed, or normalized in modern Homo furnaces. Diagrammatic drawings show the design and construction of these furnaces.

TRAILERS Features of heavy-duty truck trailers are discussed in three bulletins published by the Highway Trailer Co., Edgerton, Wis.

TRANSMISSIONS Inclosed-design variable speed transmissions of several arrangements are discussed in a 4-page bulletin now being distributed by Reeves Pulley Co., Columbus, Ind. Illustrations show a wide range of application for these units.

VALVES "The Inside Story of Crane Plug Disk Globe and Angle Valves" is the title of an 8-page booklet offered by Crane Co., 836 S. Michigan Ave., Chicago, Ill.



Fast Handling,
with *CENTRALIZED* Controls

Super-Service Radials

Super Service Radials, in 3′ to 12′ sizes, are 1938 tools in every particular. Of special importance is the centralizing of all controls at the head, with constant speed driving motor, a.c. or d.c. Gear change box at rear of arm and costly variable speed motor are thus eliminated.

Everything is arranged for the operator to work faster and with less effort. A truly modern accomplishment! Write for details.

THE CINCINNATI BICKFORD TOOL CO.
OAKLEY CINCINNATI OHIO U.S.A.

TALKING SHOP

Gentleman's Agreement — or Black List

"I don't know what you call it, and I don't much care," said a foreman the other day, "but I call it a blacklist. The boss calls it a gentleman's agreement to promote stability. The other big company in town had an opening which the super thought I could fill. It had much better prospects than I'll ever have here. But he couldn't hire me because of a gentlemen's agreement not to steal each other's men.

"The funny part is that my boss talks himself blue in the face about his men's right to work when and where they please without outside coercion. But he does his own coercing by preventing me getting a better job and better pay. That's why I feel that I might just as well be on a blacklist as far as getting a job anywhere else is concerned. I guess the point of view makes the difference."

Names

The chief engineer of a tool company was showing us some special designs and the subject of boring came up. He referred to work in one of the tools, then grinned and said, "Of course, we call it diamond boring but it really isn't because there isn't a diamond within a mile of the place.

"You know I believe we should follow the English practice of referring to that type of work as 'fine boring' and use the word 'diamond' only when such a tool is actually used."

Man Bites Machine

With all the present day discussions about the increase of automatic machinery doing away with labor, it is interesting to hear of an opposite case. Some years ago a certain food products plant installed wrapping machinery to speed up production. In the meantime, motion study with motion picture camera produced hand operation techniques which were faster than the machinery. Not only did the proper motion speed up the work tremendously, but the use of hand power allowed for certain latitude of thinking which the machine could not do. For example, if the product was too hard or too soft to wrap in a machine the human operator had no trouble in adjusting himself. There was a certain amount of flexibility which could not be permitted in an automatic machine.

Unfortunately, the perverseness of human nature caused a return to the automatic machine wrapping which was slower and not as desirable because—the wrappers went on strike for more money.

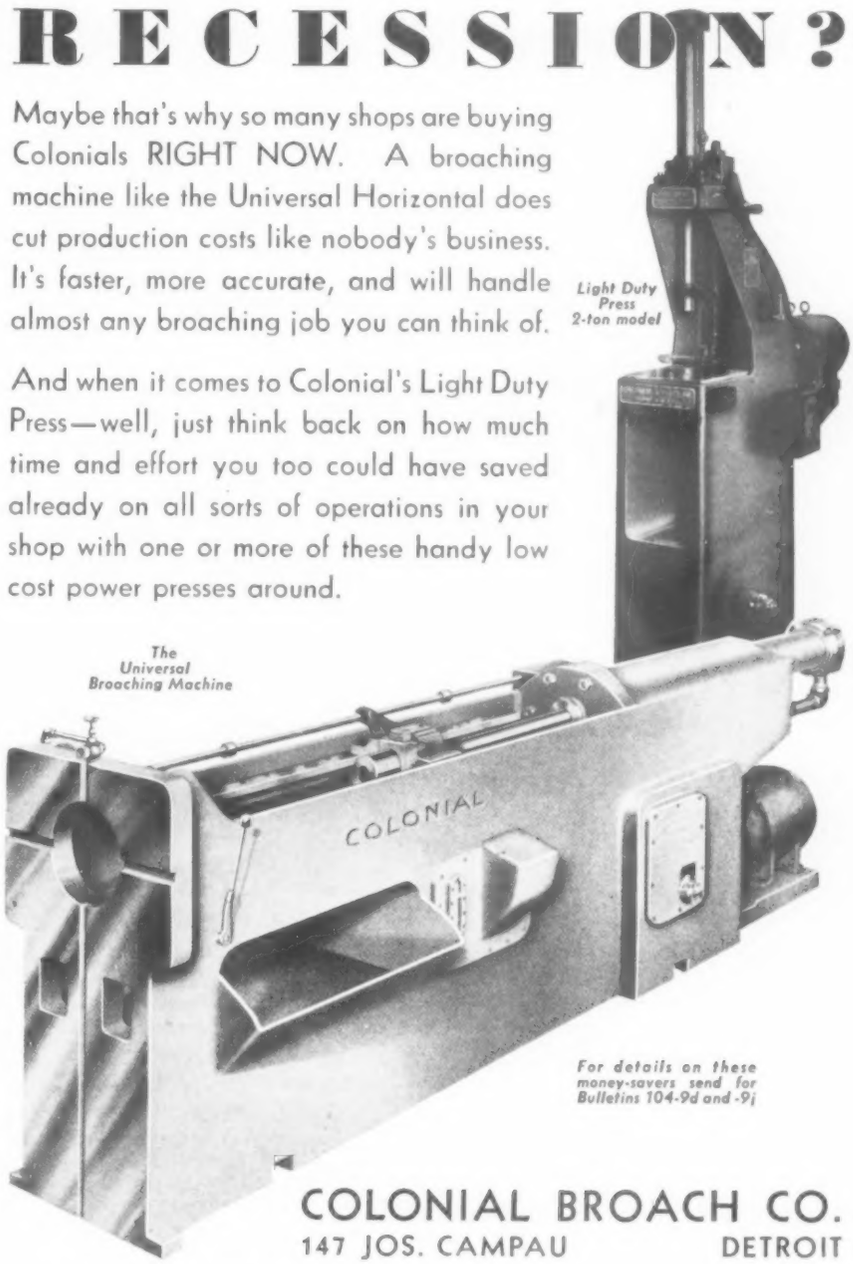
Growing Gages

A company which used large quantities of round go and not-go gages has found a quick way to repair them when they become worn under size. The gages are put through a nitriding process which will grow a smooth case on them and is satisfactory for adding as much as 0.0004 in. in size. It has been found that this process can be repeated over and over again with good results.

RECESSION?

Maybe that's why so many shops are buying Colonials RIGHT NOW. A broaching machine like the Universal Horizontal does cut production costs like nobody's business. It's faster, more accurate, and will handle almost any broaching job you can think of.

And when it comes to Colonial's Light Duty Press—well, just think back on how much time and effort you too could have saved already on all sorts of operations in your shop with one or more of these handy low cost power presses around.



Light Duty Press 2-ton model

The Universal Broaching Machine

For details on these money-savers send for Bulletins 104-9d and -9j

COLONIAL BROACH CO.
147 JOS. CAMPAU DETROIT

COLONIAL BROACH COMPANY
147 Jos. Campau St., Detroit, Mich.

Please send further information regarding Colonial Universal Horizontal and Colonial Light Duty Press, and your bulletins Nos. 104-9D and -9J.

NAME .....

ADDRESS .....

PATENTS

May 3, 1938

Metal-Working Machinery

Saw Filing Machine. Thomas H. Gavin, New Orleans, La. Patent 2,115,712.

Roll Grinding Machine and Method. Cyril A. Fox, Mars, Pa. Patent 2,115,908.

Machine for Injection of Plastics. Arthur A. Burry, Toronto, Ont., Canada. Patent 2,115,940.

Machine for Grinding Screw Threads. Herbert Lindner, Berlin-Wittenau, Germany. Patent 2,116,031.

Machine Tool (Router). William Ferdinand Ocenasek, Plainfield, N. J., assigned to Walker-Turner Co., Inc., Plainfield, N. J. Patent 2,116,122.

Jigsaw. William Ferdinand Ocenasek, Plainfield, N. J., assigned to Walker-Turner Co., Inc., Plainfield, N. J. Patent 2,116,123.

Apparatus to Automatically Determine the Angular Position of Unbalance in Rotable Bodies. Jens Sivertsen, Philadelphia, Pa. Patent 2,116,221.

Punch Press. Otto E. Seiffert, Union, N. J. Patent 2,116,326.

Machine for Tempering Springs. Charles R. Simmons, Chicago, Ill., assigned to Nachman Spring-Filled Corp., Chicago, Ill. Patent 2,116,327.

Parts and Mechanisms

Pulley. Harry A. Andreas, Muscatine, Iowa. Patent 2,115,837.

Supplemental Stock Feeding Means for Multiple Spindle Machine Tools. Samuel Baxendale, Dearborn, Mich. Patent 2,115,938.

Lock Nut. Benjamin F. Money, Tulsa, Okla., assigned in part to Charles R. Terry and Albert Cohan, Tulsa, Okla. Patent 2,116,036.

Abrading Apparatus. Walter L. Keefer, Hagerstown, Md., assigned to Pangborn Corp., Hagerstown, Md. Patent 2,116,152, and 2,116,153.

Abrading Apparatus. William A. Rosenberger and Walter L. Keefer, Hagerstown, Md., assigned to Pangborn Corp., Hagerstown, Md. Patent 2,116,160.

Speed Change Device. Joseph D. Christian, San Francisco, Calif. Patent 2,116,166.

Speed Varying Gearing. Fay M. Tomlinson, Cleveland, Ohio, assigned to Arthur M. Hood, Trustee. Patent 2,116,180.

Elastic Coupling. Per Draminsky, Copenhagen, Denmark. Patent 2,116,192.

Flexible Coupling. Neal W. Foster, Wollaston, Mass., assigned to Boston Gear Works, Inc., North Quincy, Mass. Patent 2,116,195.

Size Determining Mechanism for Automatic Machines. Harold L. Blood, Birmingham, Mich., assigned to The Heald Machine Co., Worcester, Mass. Patent 2,116,232.

Workholder for Metal-Cutting Machines. Bernard P. Schlitz, Cleveland, Ohio, assigned to The Foote-Burt Co., Cleveland, Ohio. Patent 2,116,251.

Attachment for Machine Tools (Oval Turning). Bengt Granberg and John B. Sinderson, Rockford, Ill., assigned to Sundstrand Machine Tool Co., Rockford, Ill. Patent 2,116,262.

Camoid Gearing. Karl Papello, Jena, Germany, assigned to Carl Zeiss, Jena, Germany. Patent 2,116,323.

Hydraulic Control Mechanism. Gilbert V. Anderson, Philadelphia, Pa., assigned to William F. Fischer, Philadelphia, Pa. Patent 2,116,376.

Hydraulic Transmission Gear. Hermann Fottinger, Berlin-Wilmersdorf, Germany. Patent 2,115,461.

Processes

Method of Joining Together Metal Bodies. Hans Buhler, Dortmund, Germany, assigned to Vereinigte Stahlwerke, Aktiengesellschaft, Dusseldorf, Germany. Patent 2,115,840.

Method of Forming Twisted Chain Links. John H. Hilliard, New York, N. Y., assigned to American Chain & Cable Co., Inc., Bridgeport, Conn. Patent 2,116,116.

Manufacture of Hydraulic Couplings. Gustav Bauer, Hamburg, Germany. Patent 2,116,181.

Tools and Accessories

Portable Device for End-Welding. John D. Crecca, United States Navy, and Samuel S. Scott, St. Albans, N. Y. Patent 2,115,707.

Abrasive Article. Charles E. Wooddell and Charles S. Nelson, Niagara Falls, and Roy Lincoln, Buffalo, N. Y., assigned to The Carborundum Co., Niagara Falls, N. Y. Patent 2,115,897.

Abrading Wheel Sheet and Sheet Holder. Harry W. Dempsey, Charlotte, Mich., assigned to Harry F. Hittle, Lansing, Mich. Patent 2,115,943.

Multipurpose Gauge. Martin S. Johnson, West Hartford, Conn. Patent 2,115,955.

Yielding Work Center. Stanley W. Bath, Shrewsbury, Mass., assigned to John Bath & Co., Worcester, Mass. Patent 2,116,135.

Hacksaw. Ernest A. Biester, Chicago, Ill., (deceased). Patent 2,116,137.

Multiple Purpose Welding Jig. William J. Harbaugh, Ashland, Ohio. Patent 2,116,263.

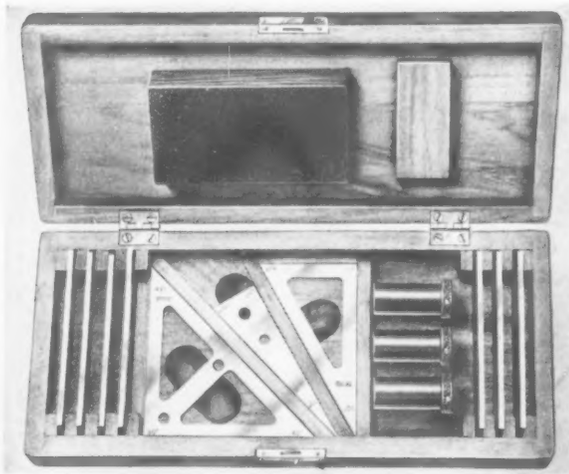
Abrasive Wheel. Arthur William Mall, Chicago, Ill. Patent 2,116,272.

Welding and Cutting Apparatus. Robert J. Kehl, Bayside, N. Y., assigned to Union Carbide & Carbon Corp., New York, N. Y. Patent 2,116,352.

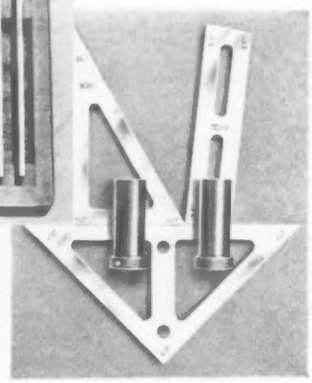
Die for Cutting Sheet Material. Charles E. Reed, Chicago, Ill., assigned to Charles

New **TAFT-PEIRCE**

UNIVERSAL ANGLE GAGES



Below — Combination of Taft-Peirce Universal Angle Gages Set to Produce an Angle of 36°



. . . accurately produce any angle between 0° and 180° . . . by 5′ Increments

Applied directly to the work—without any obstruction—this new set of patented universal angle gages marks a definite improvement over protractors or other means of measuring and laying out angles.

The complete set shown, comprises 10 independent angle gages . . . 7 of which are parallel blades with a pair of supplementary angles on each end . . . and 3 of which are triangles. The universal angle members are fixed in combination for convenient handling and use by an ingenious clamping device, 3 of which are provided in each set, as shown. All gages are made of tool steel, hardened and precision-ground so that variation from exact angle of any combination will not exceed 1′.

A set of Taft-Peirce Universal Angle Gages will be highly useful in toolrooms, die shops, manufacturing and inspection departments, for laying out and checking all angles. Each set packed in hard wood case, complete with instructions. *WRITE FOR PRICES.*

THE TAFT-PEIRCE MFG. CO.

Woonsocket T P *Rhode Island*

E. Reed & Co., Chicago, Ill. Patent 2,116,364.

Quick-Setting Adjustable Punching Apparatus. Urban G. Gochoel, Dayton, Ohio, assigned to The Egry Register Co., Dayton, Ohio. Patent 2,116,391.

NEW BOOKS

AIR CONDITIONING — FURNACES AND UNIT HEATERS. *By J. Ralph Dalzell, head, architectural engineering department, American School. 430, 6x9 in. pages, 187 illustrations, 100 tables. Published by the Ameri-Technical Society, Drexel Ave. at 58th St., Chicago, Ill. Price,* $3.00

Although the major part of this book is devoted to air-conditioning of houses, there is considerable information applicable to industrial plants. For example, there are much data on unit heaters and their use in space heating. And, of course, the methods of figuring heat losses, ducts and insulation are useful also. The author supplies many explanatory diagrams and tables. He shows the various kinds of controls which are essential to any automatic system, such as constant-temperature inspection rooms in metal-working establishments, or for maintaining comfortable working conditions.

AIRPLANE SERVICING MANUAL. *By Victor W. Page. 1,000 pages 6 x 9 in. Indexed and illustrated. Clothboard binding. Published by Norman W. Henley Publishing Company, 2 West 45 Street, New York, N. Y. Price,* $6.00.

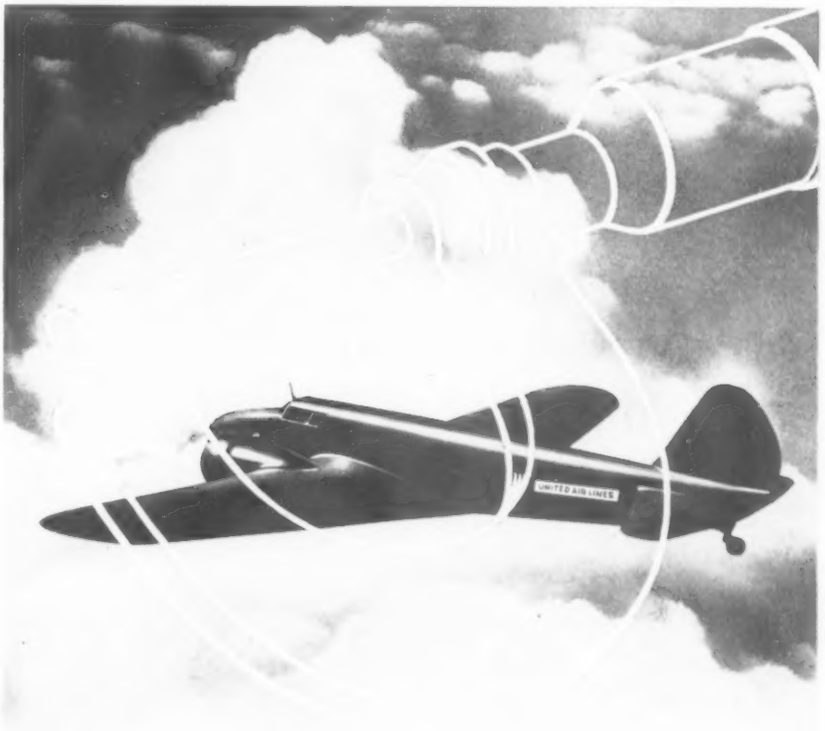
Airplane maintenance involves not only inspection but minor repairs similar to those of a modern garage in servicing automobiles. This involves so many kinds of work that the 29 chapters of this book include elementary instructions on woodwork, sheet-metal work, gas and electric welding, small machine shops, airplane engine overhaul and radio equipment.

Those who recall early flying days when 50 hours in the air meant a complete engine overhaul will be interested to note the greatly increased life of modern engines and planes. The data concerning time and cost of overhauls are of value to all interested. The halftones of the various planes and the details of their construction are excellent, and it is to be regretted that many of the line cuts were not given the same care as they detract from the appearance, if not from the value of the book.

Much of the information given, such as the chapters on soldering and welding, is just as valuable in any other line as in aviation.

The author has wisely refrained from including instructions regarding the repair of aviation instruments, although inspection and replacement are mentioned in connection with the quotations from the Federal Bureau of Vocational Education. All large transport lines have specially trained men for instrument inspection and repair. And, as the author states in his preface, "there is no substitute for actual experience", this being especially true of instruments where ignorance or lack of proper care may do great damage to these essentials.

Those interested in becoming aircraft mechanics can secure much information as to the many kinds of work to be done, and the methods in general use. There is also a large amount of general data that will be useful in repair shops of various kinds.



OFF A HAIR AND IT'S OFF A MILE

No dyed in the wool aircraft man scoffs at the importance of precision. For every aircraft man well knows that the airplane of today could never be — if it weren't for the precision methods of his industry.

Lufkin Precision Tools have played no small part in the development of modern aviation. Lufkin Micrometers and all the other Lufkin Precision Tools are built to give accurate measurements, quickly and easily. If you are interested in precision tools that you can rely upon, follow the example of America's foremost mechanics and engineers. Specify Lufkin.

Catalog No. 7 describes the entire Lufkin line of precision Tools. Write for your copy.

SOLD THROUGH DISTRIBUTORS

NEW YORK 106 Lafayette St.

THE LUFKIN RULE CO. SAGINAW, MICHIGAN

Canadian Factory WINDSOR, ONT.

TAPES — RULES — PRECISION TOOLS

"THERE'S A REAL *Quality Story* BEHIND THESE GULF OILS!"

Here is one of the machines Gulf's technical men have devised for testing lubricating oils. The oil, mixed with water, is circulated rapidly through the machine while a stream of oxygen is whipped thoroughly into it. Many oils have been tested with this instrument but none have shown stability equal to Gulf's higher quality oils.

GOOD CRUDES, refined by modern methods, make fine lubricating oils—oils that prove their quality in industry's machines. Performance in actual service is the real test of any product, including oils and greases.

Yet Gulf research engineers have not been content with the usual service tests for Gulf's higher quality lubricants. They have devised laboratory instruments which punish oils far more severely than any machine in industry . . . instruments that find ways to make oils oxidize and break down. As a result of these tests, Gulf engineers then develop oils with such characteristics that they can stand far greater punishment than they will ever receive in normal service. Thus users are assured of oils that possess a "margin of safety" well beyond average requirements.

There's a real quality story behind Gulf oils and greases. Let a Gulf engineer demonstrate to you—on the job—how Gulf's higher quality lubricants provide a greater measure of protection for your equipment—and help you reduce maintenance and repair expense.

GULF INDUSTRIAL LUBRICATION

GULF OIL CORP. • GULF REFINING CO.
GENERAL OFFICES, PITTSBURGH, PA.